The Saltonstall-Kennedy Grant Program: Fisheries Research and Development

REPORT
1982 - 1986

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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February 11, 1988

U.S. DEPARTMENT OF COMMERCE
C. William Verity, Secretary

National Oceanic and Atmospheric Administration
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National Marine Fisheries Service
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THE SECRETARY OF COMMERCE
Washington, D.C. 20230

February 11, 1988

Chairman, Senate Committee on Commerce, Science and Transportation
Chairman, House Committee on Merchant Marine and Fisheries

Dear Sirs:

I am pleased to submit the report of the Department of Commerce regarding the Saltonstall-Kennedy (S-K) Grant Program for the period 1982 through 1986, as required by Section 713c-3(d)(2) of the Saltonstall-Kennedy Act of 1954, as amended. The report discusses problems and opportunities in the U.S. fishing industry and how the S-K Program has addressed many of them.

Appendix II of the report lists the S-K projects which were funded. However, because of the volume, unfunded proposals were not listed. If there is an interest in unfunded proposals, inquiries may be directed to the National Marine Fisheries Service.

Sincerely,

William Verity

Secretary of Commerce

Enclosure

TABLE OF CONTENTS

LIST OF CHARTS

LIST OF APPENDICES

THE SALTONSTALL-KENNEDY GRANT PROGRAM:

FISHERIES RESEARCH AND DEVELOPMENT

1982 - 1986

I. THE SALTONSTALL-KENNEDY (S-K ACT)

The Saltonstall-Kennedy Act, as amended (15 U.S.C. 713c-2 - 713c-3), is administered by the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The Act provides that a fund (known as the S-K fund) will be used to provide grants for fisheries research and development projects and to implement a national fisheries research and development program. The fund is capitalized through annual transfers by the Secretary of Agriculture to the Secretary of Commerce in amounts equal to 30 percent of the gross receipts collected under the customs laws on imports of fish and fish products. As a budgetary matter, Congress has limited funds in recent appropriations to provide only for industry grants and not for a national research and development program. However, a portion of the S-K fund has been used to offset some of NOAA's costs related to operations, research, and facilities (ORF).

The following table indicates the total receipts in the S-K fund from 1982 - 1986, and the amounts appropriated for grants and the ORF offset.

Saltonstall-Kennedy Funds
1982 - 1986

Fiscal Year	Total Receipts (in millions)	S-K Appropriations (in millions)	ORF Offset (in millions)
1982	$26.2	$16.2*	$10.0
1983	$30.6	$ 8.0	$22.6
1984	$33.6	$10.0	$23.6
1985	$34.9	$ 9.0	$25.9
1986	$43.7	$ 7.7**	$34.1***

*$8.1 million for industry grants and $8.1 million for National Marine Fisheries Service's research and development program.

**does not include $0.3 million withheld for Gramm-Rudman-Hollings (G-R-H).

***does not include $1.6 million withheld for G-R-H.

II. THE U.S. FISHING INDUSTRY

Description

Fishing was America's first industry, and continues to make significant contributions to our country's economic vitality. Using conservative multipliers, the fishing industry contributes over $16 billion to the economy each year about equally divided between commercial and recreational activity.

The commercial sector of the industry is composed of harvesting, processing, and marketing segments, with associated infrastructures. In 1986, 238,000 commercial fishermen worked on over 24,000 licensed fishing vessels. Although most of these vessels are under 100 tons gross weight, in the last decade there has been a tendency in some fisheries to invest in larger, more efficient and sophisticated harvesting vessels. Processing and wholesaling employed an additional 112,000 persons. The U.S. commercial catch was an estimated 6.0 billion pounds (2.7 million metric tons).

Over-the-side sales by U.S. fishermen to foreign processors through joint venture arrangements have contributed to the productivity of U.S. fishermen, particulary in the North Pacific. In 1986, almost three billion pounds (1.35 million metric tons) of fish were delivered to foreign processors, worth about $155 million, constituting nearly 50 percent of the U.S. commercial fishermen's catch by volume and about six percent by value.

The total number of marine recreational fishermen is estimated at 17 million. These fishermen caught an estimated 699.2 million pounds of finfish in 1986 on about 72.4 million fishing trips. The recreational catch comprised about 30 percent of total U.S. landings of finfish used for food.

Although the variety of species in the U.S. catch is great, both commercial and recreational fishermen naturally tend to concentrate on the high-value species which yield good profits (and labor income) or are attractive as recreational fishing targets. In 1986, nine species accounted for 75 percent of the U.S. harvest (compared to 10 in 1980), and four species accounted for 40 percent of the value of U.S. landings (compared to 60 percent in 1980). A large portion of the catch is taken in near-shore, coastal waters--about 55 percent by volume and value.

Compared to other industrial sectors, the U.S. fishing industry is small, disaggregated, and entrepreneurial. It also differs from other food production industries because it depends upon diverse natural resources for which total catch is limited, variable, difficult to predict, and not subject to control by individual firms.

Characteristics, interests, and problems of commercial and recreational fishermen, processors, marketing entities, and consumers vary greatly from one region of the country to another.

Growth: Potential and Problems

In 1976, with passage of the Magnuson Fishery Conservation and Management Act, the U.S. moved aggressively to gain domestic fishing industry use of the fisheries resources off its coasts. Jurisdiction to conserve and manage these resources was applied by the U.S. to secure the greatest overall benefit to the Nation by promoting the development of the commercial and recreational fishing sectors of U.S. industry.

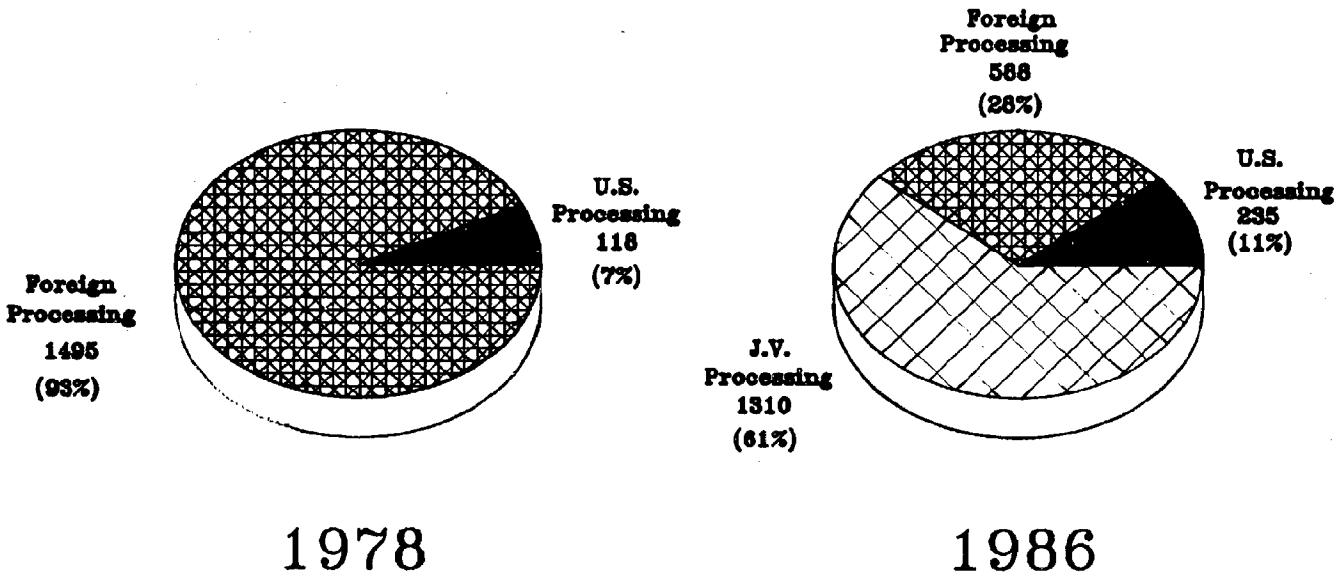
The industry initially responded with remarkable growth. During the last half of the 1970's, the volume and value of U.S. catch grew significantly with the volume of processed products growing by 50 percent as investment increased. Currently, high valued resources are fully harvested and in some cases the industry has over capitalized in vessels and gear to harvest these species. In 1986, U.S. per capita consumption of fishery products was a record 14.7 pounds. Increasing attention is being paid to the importance of fish and fish oils for a healthy diet. Other promising signs include the growth of surimi-based products and aquaculture.

However, the commercial fishing industry as a whole has not exhibited significant economic growth in the past five years. Some segments of the industry have suffered because the catches have been flat despite increasing demand. This is mainly because high value stocks are fully exploited while there is a lack of markets for low value species. Thus, significant quantities of lower-valued fish have gone unharvested, been allocated to foreign countries, or sold over-the-side to foreign processing vessels in joint ventures. As shown in Chart 1, U.S. processing of non-traditional species increased only slightly between 1978 and 1986, whereas joint venture processing has become the major activity.

Chart 1

PROCESSING OF NON-TRADITIONAL SPECIES IN THE U.S. EEZ

Thousand metric tons



Source: Fisheries of the United States.

The U.S. harvest has increased from 27 percent in 1978 to 70 percent in 1986 of the U.S. Exclusive Economic Zone (EEZ) total. However, high risks, sharp competition, lack of technological know-how and established markets still limit investment in many fisheries. In addition, recreational demand is limited to a few predominant species. The gross value of commercially processed U.S. fisheries products has leveled off during the past five years after a decade of significant growth.

The increased demand for fisheries products has been met by imported products, which have grown in both value and volume. Although U.S. exports are growing, imports continue to grow at an equal or greater rate. Many potential markets are closed to U.S. exports as a result of tariff and non-tariff barriers. In 1986, the U.S. imported a record $7.6 billion in seafood products but exported only $1.3 billion, resulting in a trade deficit of $6.3 billion, as shown in Chart 2.

Many opportunities for growth continue to exist. Realizing this growth potential is complicated by regional differences. What is needed in one region is often far different from what is needed in another.

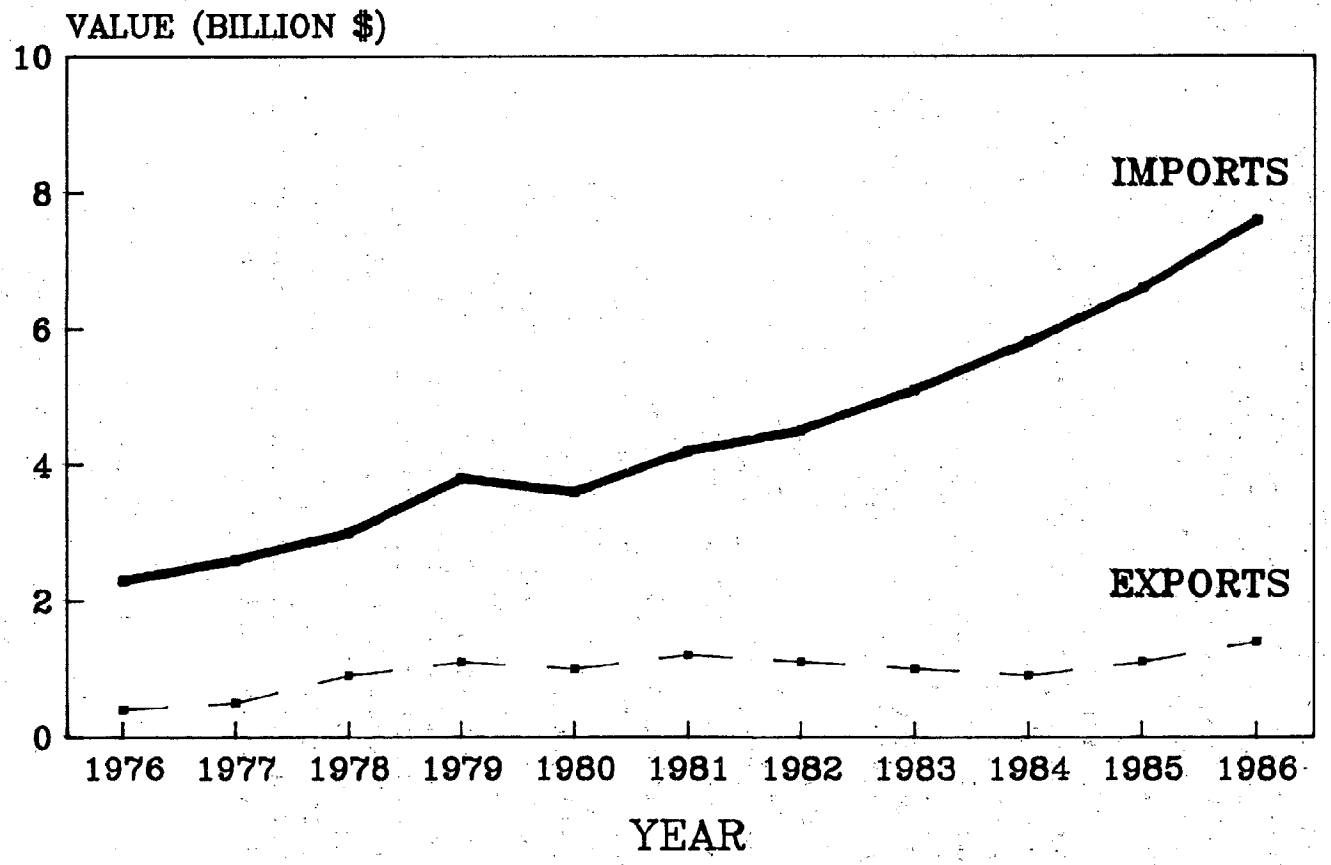
Although great potential exists for fishing industry growth, there are problems which inhibit and in many cases prevent this growth from occurring. Perhaps the most significant problem is the basic structure of the fishing industry. Many firms are too small to be able to justify their own research and development programs to support significant industry growth. The highly competitive nature of the industry, in turn, has made difficult the pooling of research and development resources on an industry-wide basis to apply to common needs. Effectively dealing with these problems requires tailored solutions, appropriate to the needs of each fishery. This is critical because of the highly technical nature of the research that will be required to achieve the next increment of growth. Much applied research is also needed.

III. ROLES OF GOVERNMENT AND INDUSTRY

The clearly-stated policy of the U.S. under the Magnuson Act and the American Fisheries Promotion Act (AFPA) is to promote the development of an industry that will use our Nation's fisheries resources. President Reagan reemphasized this policy when he issued the Proclamation of the EEZ. In such circumstances, the Federal Government can effectively act

Chart 2

U. S. FISHERY IMPORTS AND EXPORTS
1976 - 1986



as the catalyst in partnership with industry, State agencies, trade associations, and private research and development foundations to assume the high risk through financing the initial and longer term research and development. The S-K funds provide a vehicle for government participation in a meaningful way.

The full use and Americanization of the fisheries resources of the U.S. involve coordinating essential government actions with industry's own fisheries development efforts.

A broad range of activities that are uniquely governmental contribute to fisheries development. For example, trade negotiations to resolve and remove barriers to U.S. fisheries exports must be conducted on a government-to-government basis. The overall fisheries conservation and management process is sensitive to the opportunities for use of resources to achieve optimum benefits for the Nation from fisheries management programs. Much information needs to be collected by government to perform these tasks competently. Fiscal policies designed to achieve national economic goals will also affect trade in fish just as in other products.

The industry, on the other hand, must address its structural needs, identify opportunities and priorities, and take steps to develop and market fisheries products and recreational opportunities domestically and internationally.

IV. THE S-K GRANT PROGRAM

The purpose of the S-K Grant Program is to stimulate and support commercial and recreational fishing industry efforts in developing fisheries in situations where the industry is unable to underwrite these expenses itself. This purpose was established in the AFPA.

In 1980, Congress viewed the fishing industry in the post-extended fisheries jurisdiction world and determined that the fishing industry needed assistance if it was to realize the full potential from development of fisheries resources off our coasts. The result was the AFPA which amended the Saltonstall-Kennedy Act to provide for the use of S-K funds to support an industry/government partnership to stimulate commercial and recreational fishing industry efforts in developing fisheries.

The Secretary of Commerce was instructed to make grants annually to assist in carrying out research and development

projects addressed to U.S. fisheries. Specifically included were projects addressing harvesting, processing, marketing, and associated infrastructure. This was to be an industry-driven program to the greatest extent possible, with industry having the initiative in determining the pace and direction of fisheries development. The industry is required to provide a percentage of the cost of any project funded. This cost-sharing requirement has served to ensure that the industry considers the projects funded to be those that are most needed and worthy of its own investment.

The S-K Grant Program enables the fishing industry to determine its development needs, establish priorities, plan for the future, and implement those plans in a coordinated fashion. Under the program, the industry can initiate development strategies which are particularly suited to industry action, but probably could not take place as quickly without S-K support. In this regard, the S-K Grant Program is a catalyst for industry development. For the most part, projects involve high risk efforts that no single company could afford to fund but produce results that individual companies can use. For example, the government conducted the bench-level research on surimi development, whereas the industry is taking the lead in new product and market development of surimi.

Generally, except for the Western Pacific, Puerto Rico, and the U.S. Virgin Islands, S-K funding is not provided for projects primarily involving the following activities: (1) infrastructure planning and construction; (2) port and harbor development; (3) aquaculture research and development; (4) resource enhancement; (5) research evaluating the ability or extent to which fish are attracted to fish aggregating devices; and (6) extension activities such as newsletters.

V. THE S-K PROCESS

A number of fisheries have been identified by industry and government which show the greatest opportunities for development. A long range plan has been developed which describes the problems and opportunities in these fisheries, and identifies possible uses of S-K funding to address them.

Each year NOAA canvasses the industry for suggested funding priorities within the framework of the S-K long range plan. The recommendations of the industry are considered in developing the annual S-K solicitation for proposals, usually published in the spring. The funding priorities are listed by

region and nationally. After proposals are received, they undergo both technical and industry reviews. The Regional Fishery Management Councils and the public are also invited to comment. All of these reviews and comments are considered by NOAA in making funding decisions. Generally, over 200 proposals are received each year and about 50 are funded.

The S-K Program is unique in that it is well suited to responding to the dynamic nature of the industry. For example, when high costs or unavailability of vessel insurance became a critical problem in the industry, the S-K Program funded several projects which addressed the problem of vessel safety and insurance.

NOAA maintains mailing lists in the NMFS Regional and Washington Offices for those who wish to receive the S-K solicitation. The addresses of these offices are at Appendix I. The "Bibliography and Abstract of S-K Project Results" is also maintained and updated by NOAA and is available from these offices.

VI. RECIPIENTS

One concern for administering S-K grants has been the best way of getting the fishing industry as a whole to review its needs and articulate its priorities. This is particularly difficult given the fragmented nature of the industry. Although their role is not exclusive, the Regional Fisheries Development Foundations and other industry organizations have played a central role in this process. Such institutions provide a coordinating mechanism which can reach an industry consensus on issues that are essential to the success of any industry-based research and development program. The Foundations provide an interface between the industry in each region and the government to target development funds on those projects and programs which, by industry consensus, are of the highest priority.

For the most part, unlike the commercial fishing industry, the recreational community has not established organized institutions to provide a focal point for identifying needed research and development and handling S-K grants. Efforts are being made to encourage improved recreational fisheries coordination.

Other recipients of S-K funds are universities, State and local governments, private firms, and individuals. Charts 3 and 4 show the distribution of S-K funding by recipient and category for the years 1982 - 1986.

VII. PROGRAM HIGHLIGHTS - PROBLEMS, OPPORTUNITIES, AND ACCOMPLISHMENTS

Appendix II contains a complete listing of S-K projects, recipients, and funding for the years 1982 - 1986. The following section gives S-K Program highlights--problems and opportunities in the fishing industry, and how the S-K Program has addressed many of them.

Alaska

Groundfish. Groundfish resources within the Exclusive Economic Zone (EEZ) off Alaska represent one the largest and most valuable remaining development opportunities available to the U.S. fishing industry. While salmon, shellfish, and halibut have long been mainstays of the Alaska fishing industry, groundfish are now rapidly becoming an important new segment for both harvesting and processing sectors. The advent of the Magnuson Act in 1976, coupled with the virtual collapse of Alaska's major shellfish stocks and significant market problems for salmon during the 1980's, created a need and provided an alternative opportunity for the U.S. industry to begin utilization of the 2 million metric tons of groundfish resources available off Alaska. As a result, groundfish resources have been the focus of the Alaska S-K development program since 1980 and S-K funding has been viewed as a key element in implementing the Alaska groundfish development policy expressed by the Magnuson Act.

Foreign fishing nations have dominated the use of these groundfish stocks for years. Even today, these interests strongly influence the use of the groundfish resources through directed fishing, processing, and marketing activities. The foreign interests have continued to lose directed fishing privileges, down from 1.3 million metric tons in 1982 to approximately 492,000 metric tons in 1986. During this same period, U.S. harvesters began selling over the side to foreign processing vessels, fish which were previously harvested directly by foreign countries. U.S. vessels delivered over 904,000 metric tons to foreign processors in 1986.

Chart 3

The Distribution of S-K Funding By Recipients, 1982-1986

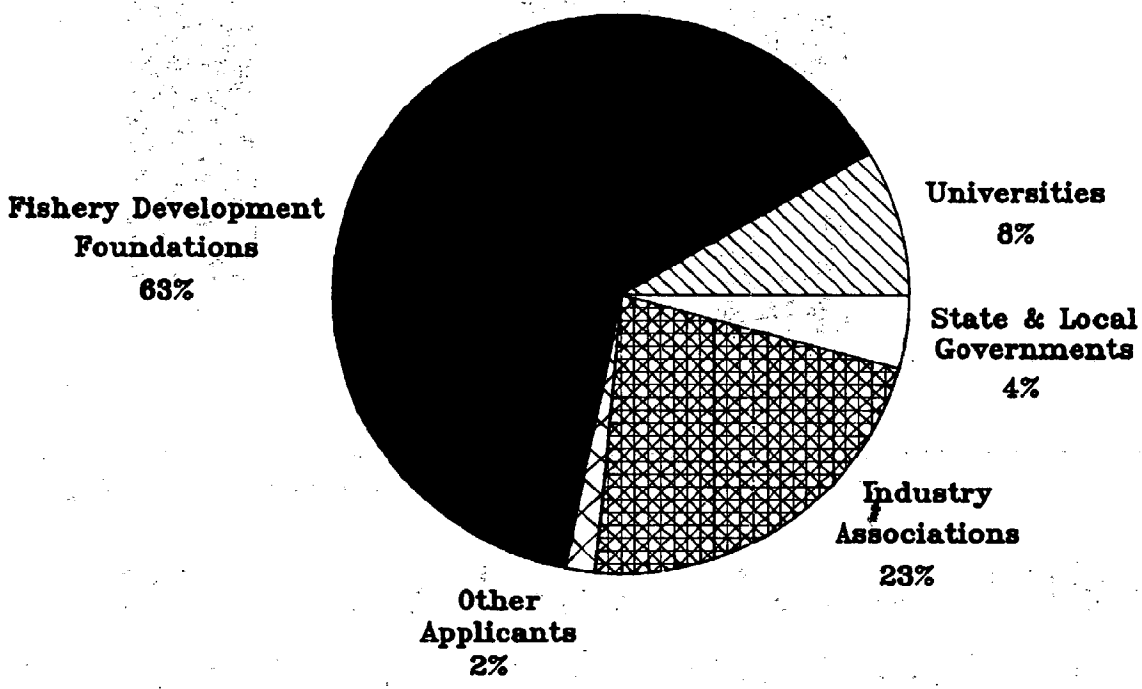
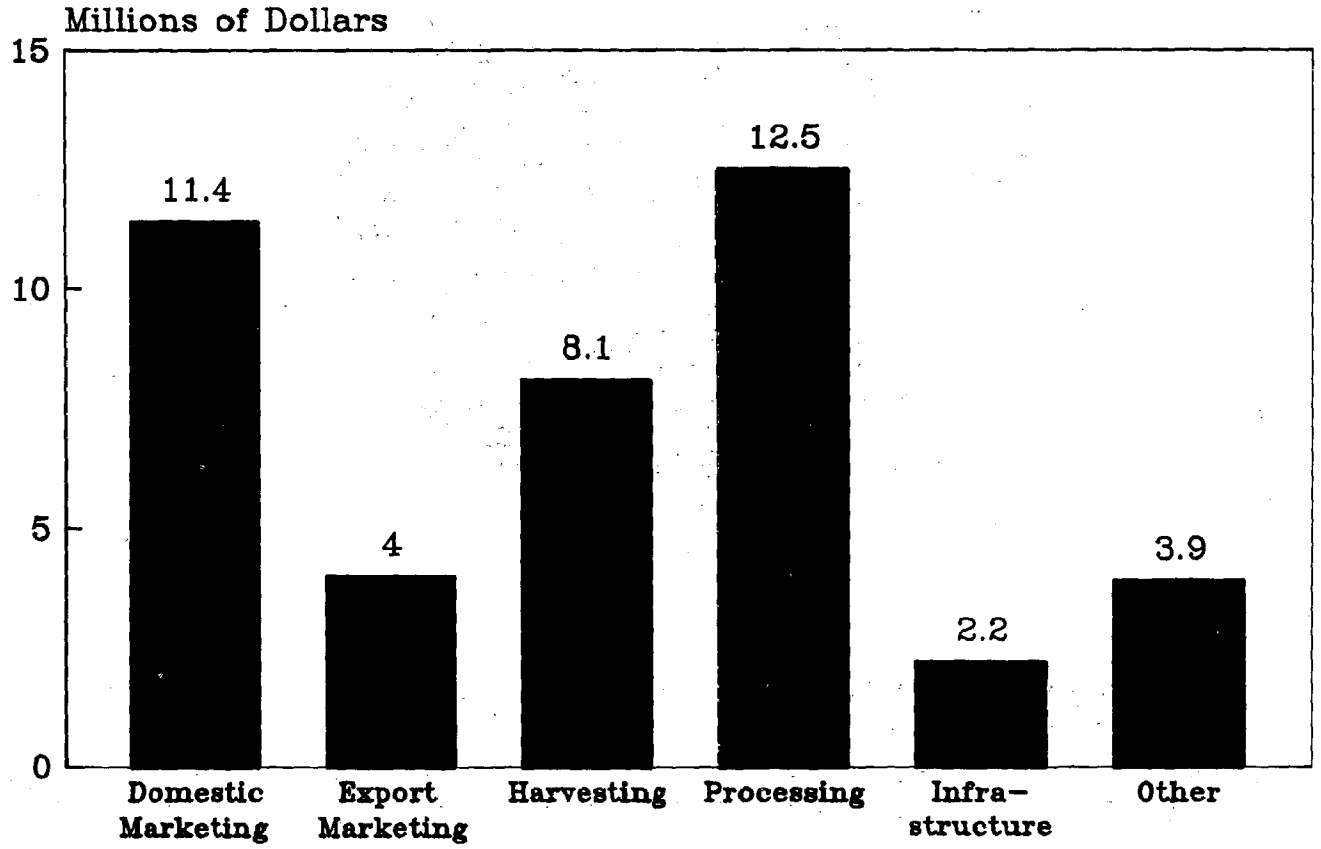


Chart 4

THE DISTRIBUTION OF S-K FUNDING BY CATEGORY, 1982-1986



The potential economic contribution of full domestic utilization of the Alaska groundfish resources has been estimated at several billion dollars annually. This estimate presumed that the industry would develop in a balanced manner with the domestic processing capacity increasing at a rate comparable to that experienced by the harvesting sector. This balanced development has not occurred. At the present fleet level, most of the available Alaska groundfish resources are being harvested by U.S. vessels, but additional processing capability and market access are required. Approximately 18 new factory trawlers have come on line since 1981 and there have been construction and conversion of approximately half that number of shoreside processing facilities. The shellfish and salmon problems mentioned earlier have adversely affected the shoreside industry's ability to attract necessary new capital for plant conversions.

To capture the full, value-added potential of the Alaska groundfish resources for the domestic economy will require investments in excess of a billion dollars. Bankers, investors, and other sources of capital have been reluctant to supply these funds because of the newness of this kind of activity for the U.S. industry, its inexperience in large scale processing of groundfish, concern about the competitive position of the U.S. in the international groundfish marketplace, the existence of trade barriers, and uncertainty about the fishery management regime likely to be imposed on fishing activities in Alaska.

A study funded by S-K, has produced a strategy for the Americanization of the Alaska groundfish fisheries which could dramatically improve the role of U.S. processors and harvesters. Included in the study are the results of the comparative cost analysis of U.S. processing and harvesting operations vis-a-vis other major groundfish producing countries in North America, Europe and Asia; a summary of the major market opportunities for processed Alaska groundfish in the U.S., Europe, Korea, and Japan; strategic recommendations as to how those markets can best be penetrated, taking into account the comparative cost position of the U.S. processing sector; and various policy alternatives which must be considered by the government and the industry if the U.S. policy environment is to be supportive of the Americanization goal for Alaska groundfish. This study focused on Alaska pollock, the most important species available in large quantities and still underutilized by the U.S. processing sector. The use of this species has long been dominated by foreign interests.

Pollock is the key species utilized by Japan in the production of surimi, a frozen semi-processed wet fish protein utilized as a base for a wide range of analogue seafood products as well as an ingredient in other food products. The U.S. food industry is showing substantial interest in surimi. The lean, white flesh of pollock also lends itself well to block, stick, fillet, and portion production. Millions of pounds of these product forms are annually imported to the U.S. from nations fishing within the EEZ off Alaska. A new U.S. industry operating on Alaska groundfish has the potential to replace 75 million pounds of pollock surimi products and 600 million pounds of whitefish fillets and blocks currently imported at a primary wholesale value of nearly $1 billion.

A model whitefish project at Akutan, Alaska, supported by S-K funds, addressed the vast information needs of the newly emerging domestic groundfish shore-based processing industry. This project successfully explored the required operational strategies and financial risks of Americanizing the Alaska groundfish fishery. Information developed on processing technology, product forms, marketing, production costs, financing, and plant designs paved the way for today's operational groundfish processors.

A great deal of S-K support has been focused on pollock surimi, which has proven to be the single greatest opportunity for seafood industry development in the Nation and represents an unqualified S-K success story. Through a series of S-K surimi development projects over the past several years, the first shore-based pollock surimi plant in the U.S. was set up in Alaska and demonstrated that surimi can be produced successfully on shore in the U.S. Equally important has been the gradual understanding of the surimi processing technology and acceptance of its potential.

Armed with a working understanding of the Japanese surimi-making technology and the results of handling and storage studies, these projects focused on quality, consistency, technological improvements and production economics. More than 1.2 million pounds of surimi samples have been produced and made available for testing by prospective food industry users across the country. The surimi industry development projects have been touted in more than a hundred magazines and newspapers, including Business Week, Newsweek and the Wall Street Journal. For the first time, U.S. food companies have been encouraged to use Alaska surimi in non-seafood dishes, opening up a billion-pound, billion-dollar market segment never before available to seafood processors. S-K projects are now concentrating on developing new market forms for Alaska surimi and pollock by-products within the U.S. food industry.

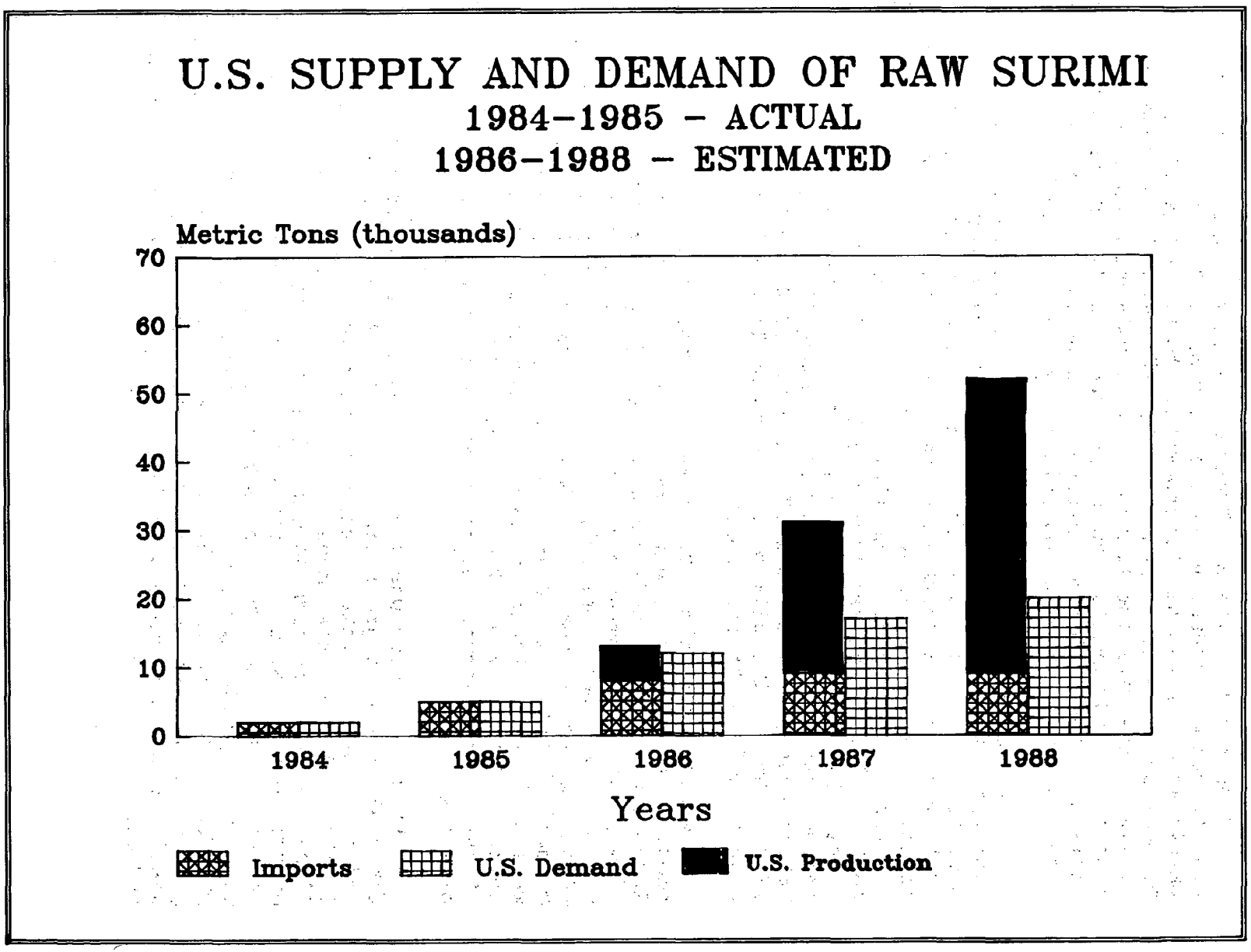
A spin off of the S-K Program saw other industry funds used to support industry needs in surimi production development. A manual, "Introduction to Surimi Manufacturing Technology," was developed and a training school was held in Alaska to transfer the technology in a uniform manner to production and quality control personnel of 20 U.S. processing firms planning to become involved with surimi. Thousands of requests for surimi-related information have been fielded.

The potential development of the U.S. surimi industry is enormous. A recent NOAA study has identified seven private U.S. firms which are currently operational, will be producing soon, or which have commitments from U.S. or foreign banks. These firms should all be producing surimi by 1988. In addition, three other firms show a high potential for constructing surimi manufacturing facilities over the next few years. As shown in Chart 5, estimates are that if all these become operational, the U.S. will produce 25,000 to 30,000 metric tons of surimi in 1987 and about 50,000 metric tons in 1988. The results will be far-reaching in terms of the Alaskan economy and the entire seafood industry.

Marketing by the U.S. industry of the products to be produced from the Alaska pollock resource is recognized as a large and expensive undertaking. As U.S. production began to climb, the first domestic Alaska pollock promotional efforts were initiated with the help of S-K funds. Projects promoting Alaska pollock in retail and institutional trade markets were funded in 1983-1986. Over this four-year period, promotions were held in San Franciso, Denver, Minneapolis, Chicago, St. Louis, and Milwaukee. The S-K funds were combined with those of the private sector and the State of Alaska to maximize benefits.

Product quality was identified as a key consideration by the newly emerging groundfish industry. As a result, the industry has undertaken a sizeable education program at all levels to improve the image of both traditional and new fisheries products from Alaska. S-K projects related to education and seafood quality assurance from the catcher vessel to the consumer have been a part of the industry effort. Seminars, workshops, news releases, processing manuals, promotional materials, video tapes, and handling demonstrations produced from these projects have contributed to improved quality of U.S. fisheries products going to domestic and export markets.

Chart 5


U.S. SUPPLY AND DEMAND OF RAW SURIMI
1984–1985 – ACTUAL
1986–1988 – ESTIMATED
Metric Tons (thousands)
70
60
50
40
30
20
10
0
1984
1985
1986
1987
1988
Years
Imports
U.S. Demand
U.S. Production

A significant portion of the U.S. fleet harvesting groundfish off Alaska is based in the Seattle area. S-K projects supporting some needs of this group are administered by the Northwest Region of NMFS. The focus of these projects has also been on pollock, including new product development, domestic and export marketing, and evaluation of alternatives to the use of pollock other than surimi. This evaluation included analysis of the operational and economic aspects of maintaining product quality during processing and storage, and using several methods of processing reconstituted fillets and portions from fresh and frozen minced pollock. This research demonstrated that high quality minced pollock could be maintained for long periods of time if freezing occurred immediately after production. In addition, the versatility of pollock was shown through its successful use in other food products, such as pizza, chili and soups.

A current S-K project is addressing the international competitiveness of the North Pacific seafood industry and will identify tariff and non-tariff barriers preventing or impeding exports of pollock and other Northwest products. Another will analyze the relationship between foreign fishing allocations of Alaska pollock and the competition faced by U.S. harvesters and processors of Alaska pollock products in the U.S. and in key markets in Europe and the Far East.

Two other major S-K efforts are also underway. The first is to reduce and minimize the by-catch of king and tanner crab in trawl fisheries directed at demersal groundfish in the Bering Sea through gear test evaluations and commercial trials. The second involves the development of new technology to use automated optical processes to detect and remove parasites from pollock. Current practices are imprecise and inefficient and require manual procedures. The new technology being explored includes both X-ray and hydroacoustic techniques to identify parasities coupled with computerized systems using either laser or water-jet removal processes.

Other Species. S-K funds have been targeted on other Alaska species, including salmon, sablefish, octopus, and razor clams. U.S. industry needs during and following the salmon botulism problem in 1983 were supported in part by S-K funding. Market research to profile consumer habits, preferences, and attitudes regarding U.S. salmon products was conducted, followed by a consumer information program to build awareness and stimulate demand for Alaska salmon.

Canned seam integrity, the cause of the botulism problem, initially became an area of multi-year research under S-K for development of detection equipment to assure safety of canned salmon products.

A project to expand domestic marketing opportunities for Alaska sablefish was carried out in 1984 and 1985. This species is now fully utilized by U.S. fishermen and domestic market opportunities provide alternatives to the total reliance on export markets for this species.

The first directed work at development of the valuable octopus resource in the Aleutian Islands was carried out through S-K funding. Useful information on gear, fishing depths, and habits of octopus, is now available to fishermen for this species.

Development of the very large Alaska razor clam resource has for a number of years been dependent upon creation of a mechanical or hydraulic dredge capable of operating under extreme Alaska tidal conditions. S-K funding supported the development of the first successful hydraulic dredge in the Cook Inlet area and a new fishery for the razor clam resource was initiated.

Washington, Oregon & California

West Coast Groundfish. The domestic harvest of West Coast groundfish increased from 60,000 metric tons in 1977 to 164,093 metric tons in 1986. Of the 1986 total, about 82,238 metric tons were processed by U.S. shore-based processors, and 81,855 metric tons of Pacific whiting were sold at sea by U.S. harvesters to foreign floating processors. The estimated acceptable biological catch of groundfish species in 1986, 413,560 metric tons, was made up largely of Pacific whiting and shortbelly rockfish which are not fully used. Most other species are fully used or cannot be caught without taking other fully used species. Some species, such as Pacific ocean perch, sablefish, widow rockfish and the Sebastes complex of rockfish, are under strict management to prevent overfishing and/or to rebuild the stocks.

The number of commercial trawl vessels, the predominant gear type in the West Coast groundfish fishery, has increased from about 280 vessels in 1976 to about 310 in 1986. Production from the present fleet is unlikely to increase and may well decline with time as a consequence of overexploitation

of rockfish. The fleet's only alternative would be to become involved in fishing for nontraditional groundfish, such as Pacific whiting, shortbelly rockfish, or pollock off Alaska.

Pacific whiting has a flaw, however, which has impeded its development. It has a parasite which produces an enzyme that routinely deteriorates the flesh of the fish unless specially handled, held, processed, or cooked. Although the commercial incidence of such deterioration is less than eight percent, the public perception of Pacific whiting flesh has been that it is "soft" and "mushy" and difficult to use in traditional products.

The processing sector of the West Coast industry has not developed at the same pace as the harvesting sector. The perceived high risk, fluctuations in landings, lack of capital and attractive financing, and the high investment associated with processing plants have slowed the growth of this sector. Foreign competition in markets for groundfish has also been a factor. Thus, achievement of full domestic use of the species not currently used by U.S. fishermen and processors is impeded by (1) lack of access to domestic and foreign markets; (2) lack of public acceptance of whiting and shortbelly rockfish; and (3) inadequate methods for efficient handling and processing.

The S-K Program has addressed many of these problems. New Pacific whiting and other groundfish product concepts have been developed and tested for market acceptance. Quality, shelf life, and continuity of delivery were addressed. Major domestic and foreign marketing activities were undertaken. Domestic market efforts included development of point-of-sale materials; representation at major retail and merchandising trade shows and seafood expositions; coordination of media, wholesalers and retailers into integrated market promotions; and dissemination of information through publications, news releases, conferences, workshops, and other special events.

Extensive market research on Pacific whiting was conducted on the Los Angeles area Hispanic market. The optimum package design and nomenclature to position whiting as a discernable commodity to Hispanic consumers were developed. An advertising and promotional effort followed. The result of this S-K investment was that whiting, traditionally a commodity of low value, was transformed into a desirable consumer product. Orders have been placed by key accounts in Southern California retail chains. Industry members remain committed to this new market and believe consumer acceptance will continue to grow.

An S-K supported seafood promotion and education program was established in Southern California to educate and train food service workers about seafood basics and stimulate interest and enthusiasm for seafoods and their versatility, convenience, and profit potential. During a two-year period, over 65 seminars were presented to college food service students and educators, and restaurant and hotel employees. This program no doubt contributed to the increase of seafood restaurant franchises in California by providing training and education to the individuals involved in handling, preparing and serving seafood to the public.

An industry planned and directed prototype retail training school is also being developed in California with the use of S-K funds. This two-year project will train retail outlet personnel (clerks, department managers and corporate executives) on every phase of seafood harvesting, preparation and marketing.

Another West Coast groundfish marketing effort targeted Denver, Minneapolis and Phoenix, whose citizens did not consume much West Coast seafood. Producers and wholesalers were organized to promote and market West Coast rockfish and other West Coast species. These efforts resulted in sharp increases in consumption of these products in the target cities. Other targets of successful West Coast seafood promotional efforts were military and other government institutional markets. West Coast processors also participated in successful foreign trade shows.

Another major problem facing Northwest and other fishermen is the rising costs of vessel insurance. The current range of insurance for many vessels based in Seattle, for example, is between $60,000 and $100,000. Such costs eliminate profit margins and competitiveness in foreign and domestic markets. High insurance costs have been directly related to safety on the vessel. In conjunction with the U.S. Coast Guard and marine underwriters, S-K projects were funded in the Northwest which produced a vessel safety manual and video tapes designed as operational safety recommendations for fishing vessel skippers and crews. The manual organizes and presents voluntary safety standards for U.S. fishing vessels. The manual and the Coast Guard's Navigation and Vessel Inspection Circular (NVIC) 5-86, are now recognized as the latest and best information available on fishing vessel safety, and are regarded as national standards by the Coast Guard, the fishing

industry and marine insurance underwriters. Courses using the manual are now being privately funded and conducted throughout the Pacific Northwest. Clearly, with a little S-K seed money, a major industry problem has been confronted and the private sector is now directly addressing the issue.

West Coast Coastal Pelagics. West Coast coastal pelagics species (mackerel, anchovy, squid, bonito, etc.) have a total potential harvest in excess of 400,000 metric tons per year with an exvessel value of over $60 million. These fisheries, however, are currently being harvested far short of this potential. In recent years total exvessel revenues have fallen about 42 percent (from $22.9 million in 1981 to $13.4 million in 1986). Large fluctuations in resource abundance and availability and poor market conditions are the most significant impediments to achieving maximum commercial and recreational benefit from these fisheries. Mackerel has been identified as having great potential for development. This potential is presently limited by its low exvessel value and limited demand for use as a canned product.

In addition to their commercial importance, the coastal pelagic species serve as both targets and bait for growing marine recreational fisheries which annually contribute more than $40 million to the Southern California economy.

An S-K funded project focused on the distribution and abundance of squid in areas and seasons not traditionally fished off California. In addition, investigations were conducted on squid preservation methods aboard vessels. The project did not locate any significant new quantities of squid (Loligo opalescens), probably due to the presence of warm water conditions caused by El Nino. The project did, however, disseminate information to potential squid fishermen thoughout the Northern California region and contributed to existing knowledge of squid movements and behavior. Because no significant quantities of squid were found, the preservation research phase of the project was cancelled.

S-K funds were used to investigate the feasibility of developing technology to automatically sort squid by size and sex (female squid with roe have high export value). Current practice involves manual sorting. Both the physical properties of squid and two automated sorting systems were examined. A sex and size sorting system using a digital camera linked to a computer was found most sucessful. The system operates at sufficiently high rates to be useful in industrial applications. The system is ready for test applications in processing facilities.

The squid fisheries off Washington and Oregon have also been the subject of S-K funded research. Studies which estimated squid biomass in major spawning areas off the Oregon coast resulted in the State of Oregon now having state-of-the-art hydroacoustic technology to assess location and biomass of squid and other related species. In the Washington squid fishery, methods to avoid incidental catches of salmon and herring were examined. These studies have provided more precise information on the cost effectiveness and profitably of harvesting squid (Loligo opalescens) in the Pacific Northwest.

To promote squid, point-of-purchase materials were developed including cleaning instructions and recipes. A symposium was conducted in which squid processors and fishermen from California and the Northeast shared their expertise with those in Oregon and Washington interested in developing a local fishery. The symposium proceedings were provided to hundreds of industry members.

Marine Recreational Fisheries. Recreational fishing in Washington and Oregon suffered an economic downturn because of the decline of the salmon resource. Because of severely reduced salmon fishing seasons, the recreational fishing industry has successfully sought to develop new fishing opportunities for more plentiful non-salmonid species. A major impediment to developing these fisheries was the public's attitude that only salmon could provide a satisfactory recreational fishing experience. Through the S-K Program, six projects were conducted in Washington and Oregon to redirect fishing effort toward non-salmonid species. Evaluation of the results of these marketing efforts has shown that fishing effort and expenditures for non-salmonids increased during the marketing period and thereafter. These programs also developed better information regarding public attitudes and motivational factors with respect to deep sea fishing. This information is being used by the industry to evaluate and restructure marketing strategies.

A black rockfish stock delineation study was funded in Oregon. In this project, 5,000 black rockfish were tagged and released by charterboats. The preliminary tag returns have been helpful in determining movements of this stock.

S-K funds also supported development of a forecasting model which predicted the economic effects of recreational species availability on angler purchases and retail sales in California. The model can now be used to forecast the economic effects (at the regional and State level) of changes in marine recreational fisheries resources.

Albacore Tuna. In recent years, upwards of 750 vessels have participated on a regular basis in the U.S. albacore fishery which occurs almost entirely in the Pacific Ocean north of the equator and seaward from the West Coast to approximately 180 degrees longitude.

The albacore fishery is seasonal, and catch is dependent upon both environmental and economic conditions. Between 1981 and 1986, total catch for Washington, Oregon and California fluctuated from a high of approximately 13,000 metric tons in 1981 and 1984 to a low of approximately 5,300 metric tons in 1982 and 1986. The average catch and value for the six-year period, 1981-1986, was 8,800 metric tons per year worth $12.8 million to the fishermen of the three States.

Traditionally, the dominant product form for albacore has been canned, white meat tuna. Virtually all albacore caught by West Coast fishermen was sold to canneries. Between 1981 and 1984, volatile market conditions, caused in part by an influx of canned tuna imports and high domestic labor costs, resulted in the closure of three tuna canneries in California and one in Hawaii. During this period the price paid to fishermen dropped from a high of $1,800 per ton to a low of $1,000 per ton.

Beginning in 1982, a series of S-K projects have focused on developing both alternative market forms and alternative markets for Pacific albacore. One project was designed to produce a high quality fresh/frozen product using techniques very different from those used for fish harvested for canneries. The technique included bleeding the fish immediately, heading and gutting it, washing, then vacuum packing it. Vacuum-packed fish were then blast frozen and kept at minus 22 degrees F. until unloading. As a result, additional boats have become involved in on-board processing and vacuum-packing albacore, and fishermen are getting a higher price for their quality products than they could for fish delivered to the cannery.

Another project developed and implemented a marketing plan for fresh and frozen albacore. Included were development of quality standards for on-board handling, point-of-sale materials, food editor releases, and in-store demonstrations. By early 1986, a growing market for fresh albacore had been established.

Although the fishery for albacore on the West Coast is seasonal, it has not been shown to be limited in resource abundance. In order to reach the objective of greatly increased catches and maintain the developing fresh and frozen markets, however, year-round supplies must be found and

maintained. The fishery must be expanded into areas not presently fished. Through the S-K Program, the industry evaluated, with positive results, the potential for establishing a U.S. fishery on albacore tuna during the winter months between the U.S. West Coast and Hawaii and in the Southwest Pacific area.

Western Pacific

Tropical Tuna. U.S. tuna canneries, in an effort to meet domestic demand, imported foreign-caught tuna which amounted to 268,944 metric tons in 1986. Increased catches of tropical tuna fisheries by the U.S. fleet could reduce this dependence on foreign imports and improve the U.S. fisheries balance of trade.

The U.S. tuna fleet in the Eastern Tropical Pacific has been faced with numerous problems, including uncertainty about access to tuna resources, spiraling costs, stagnant catch rates, vessel seizures, increased foreign competition, relocation of U.S. canneries out of California, and government restrictions on porpoise kills.

With S-K support, U.S. purse seiners have explored selected regions of the Western Pacific and collected vital data on developing Western Pacific surface school fisheries for skipjack and yellowfin tuna. This effort contributed to a major relocation of the U.S. tuna fleet to the Western Pacific and the development of the most productive tuna fishing area for U.S. vessels. About 35 U.S. seiners caught an estimated 130,434 metric tons of tuna in the region during 1986, accounting for 56 percent of total domestically caught U.S. cannery receipts and U.S. exports of raw tuna. Total domestically caught deliveries from this area increased eight percent over 1985. The Western Pacific was also the area from which most of the raw tuna imports originated in 1986, 23 percent of total U.S. imports. Recent surveys in waters of the South Pacific have been very successful in demonstrating the presence of a surface fishery for albacore tuna. The excellent catch rates experienced in two years of exploratory fishing are likely to attract a growing fleet of U.S. albacore troll vessels in the South Pacific.

While the new Western Pacific tuna fisheries were taking hold, the small-scale tuna fisheries in Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands continued to operate and land tuna and billfish, much of which

was targeted for consumption in the fresh fish market. In Hawaii, pole-and-line fishing remains the principal harvest method for skipjack. In American Samoa, Guam, the Northern Marianas, and the Trust Territory of the Pacific Islands, the principal fishing method is trolling from small vessels, a fuel intensive and high cost method of fishing. Although catches from these fisheries have never been large, and indeed have declined, growing demand for sashimi quality tunas makes them extremely valuable to small scale fishermen.

A number of S-K funded projects have been carried out in an effort to expand small scale tuna fisheries in the Pacific Islands. Several projects were carried out in Hawaii and Truk State to explore ways of increasing the availability of live bait to locally based pole and line tuna vessels. Other projects in the Pacific demonstrated alternative techniques (e.g., longline, handline fishing) to harvest high quality sashimi grade tunas.

In order to help Pacifc Island territories plan for future participation in the industrial tuna fishery, S-K funded studies were carried out on tuna transshipment opportunities in the Pacific and the feasibility of small scale tuna canneries to supply local consumption.

U.S. Pacific Island Fisheries. Fisheries have assumed an important role in spearheading economic development in the U.S. Pacific Islands. The Islands view fisheries as one of the few resource bases available for economic development to improve local income, diversify economies, and reduce dependency on shipments of goods and services from the mainland and from other countries.

Each island government has prepared a fisheries development plan to identify opportunities and serve as a guide for public and private investments in fisheries. The development of island fisheries will involve balancing economic growth with biological limits and cultural needs. The island governments acknowledge that coastal reef fishery resources are limited, and that uncoordinated growth and new entry in fisheries could quickly deplete stocks and disrupt established local fisheries. Significant increases in fisheries production in the various island fisheries will have to come from a larger fishing fleet which can operate in remote reaches of the island archipelagoes. To attract new entry and investments in fisheries, there is a need to improve infrastructure facilities such as docks, ice houses, storage and transshipment facilities. Better product handling techniques and market development are also needed.

While relatively small in total landed value, the value of U.S. Pacific Island fisheries on a per capita basis equals or exceeds the value of landings in many mainland States. Effort, landings, and value have increased in recent years. More offshore fishing grounds are being exploited by new, larger vessels, some of which have moved to the Central and Western Pacific from depressed West Coast and Alaska fisheries. Most nearshore fish stocks in Hawaii, American Samoa, Guam, the Northern Marianas, and the Trust Territory of the Pacific Islands are fully exploited by commercial, recreational, and artisanal fishermen. However, stocks of offshore pelagics, bottomfish, and crustaceans offer substantial opportunity for increased harvests. Among the species of primary interest are deepwater bottomfish (opakapaka, onaga, ehu), shallow water snappers (uku, taape), reef predators (giant ulua, pig ulua), and deepwater shrimp.

Island fisheries are the only ones in which S-K funds have been used for infrastructure planning and development projects. Because of the highly underdeveloped nature of island fisheries, as well as the economics of many of the islands, the industry not only lacks capital resources but also access to capital. Completed projects include the design of commercial fishing facilities in Saipan and American Samoa, the deployment of floating docks in American Samoa, improvements to a fishermen's cooperative in Guam, and launching ramps in the Northern Marianas. All of these projects have greatly improved the support infrastructure for commercial fishery activities in the islands. Centralized fishery facilities developed in a number of areas now offer fishermen one stop shopping for basic services (e.g., moorage, cold storage, fuel, ice) and ready market outlets for their catch which were previously unavailable. The design and construction of boat launch ramps have improved access to offshore fishing areas for commercial and recreational small boat fishermen. Other infrastructure projects are underway in Truk, Guam, and Yap.

The S-K Program has also supported several shellfish reintroduction projects in Palau and Ponape involving the giant clam and the trochus. The projects in Palau have pioneered mariculture techniques for giant clams and have resulted in a hatchery operation capable of producing hundreds of thousands of giant clam seed per month. As a result, the reefs of Palau and several other island areas are being sucessfully reseeded with giant clams, a commerically valuable creature that has almost reached extinction. Several island governments have independently started projects modeled on the success of the Palau project. A current project will conduct a feasibility study on deep water shrimp in Palau.

Several promotional and market development projects in the islands have resulted in increased sales and higher prices to island fishermen.

Resource enhancement projects, including development of artificial reefs and fish aggregation devices, have also offered opportunities for S-K assisted industry development in the islands.

Southeast

Latent Resources. Waters of the Gulf of Mexico and South Atlantic support several important, and many undeveloped, fisheries. Landings from the region total well over 1.0 million metric tons annually. The Southeast accounts for over 35 percent of all U.S. landings, representing 25 percent of the value of the domestic catch. However, estimates of development potential of Southeast latent resources are even more impressive. It is estimated that over 1.2 million metric tons of edible groundfish go unharvested annually, including about 175 individual species. The groundfish complex includes primarily the sciaenids, with croaker, spot, drum, and sea trout being the most important. The sciaenids represent about 95 percent of the groundfish harvest, as well as most of the finfish discard from the shrimp fleet. Groundfish were historically used extensively in the production of fish meal and pet food, but are now being considered for upgrading into food products for human consumption.

There has been rising interest in the region's herring-like resources, as well as selected migratory coastal pelagics. There are 11 major herring-like species, but unlike the groundfish, use of these stocks has historically been minimal. Recent harvests of thread herring, Spanish sardines and other small, coastal pelagics indicate tremendous interest in these resources for pet food, fishmeal, bait, and for human consumption. Estimates currently place the standing stock at greater than 700,000 metric tons.

Another major potential for expansion is a group of fish currently harvested in the purse seine fishery for both domestic and export markets. This group includes mullet, blue runners, drum, bonito, and jack crevalle.

A well coordinated fisheries development effort in Southeast latent resources is especially appropriate because of the declining access to traditional target species (king

mackerel, Spanish mackerel, grouper, red snapper, red drum, etc.). Latent stocks of small coastal pelagics, squid, and other species can provide a means of shifting capital investment and labor away from fully utilized fisheries while maintaining the economic health of the Gulf of Mexico fishing industry. Success in this endeavor could reduce the U.S. trade deficit since many of these resources are prime candidates for export markets.

The S-K Program has played a major role in the development of Southeast latent resources. Cooperative foreign and domestic market studies by industry and government have served to expand both export and domestic marketing opportunities. The overall goal is to bring new, heretofore unused species to the attention of American consumers and to increase the demand for these products in export markets. By creating more dependable markets and increasing the amount of products sold in existing or new market areas, efficiencies of scale and continuity promise to lower the cost of seafood to consumers while enhancing earnings in the seafood production, processing, and distribution industries.

Over the last five years the S-K Program has supported the Southeast fishing industry's participation in over 70 domestic and foreign trade shows. In addition, foreign market research resulted in numerous foreign trade missions, foreign trade fairs and related export activities. Industry participants bore the cost of travel and other expenses, as well as providing most of the samples used in the promotion. Marketing specialists were engaged to coordinate these activities, using a combination of industry and government funds. Most notably, international trade missions to the Middle East and African nations significantly altered the trend in export markets.

During 1983, for example, results of the international trade work documented an increase in 62 million pounds of fish sold into new markets via the foreign market research, trade shows, and missions. Specifically, markets were opened for shark in Hong Kong, mullet in the Middle East, and other latent species in Nigeria and other export markets. A review of foreign market investigations estimated an increase of exports to four targeted countries by 20 percent over a two-year period in terms of value, and over 30 percent in terms of volume. Southeast figures were particularly impressive for products other than shellfish, i.e., those heretofore underutilized. Thus, the data suggests that promotional efforts were beneficial for all fishery exports in general and for underutilized fish in particular.

Promotional strategy using target species, target markets and a market development team concept with a high level of industry leadership and involvement proved to be very successful. During a one-year period, 2,543 contacts were made with seafood business firms and 952 contacts with media firms throughout the midwestern U.S. Seafood suppliers throughtout the Southeast experienced both new and expanded sales in the target markets.

Detailed descriptions and evaluations of marketing programs have been made annually. In addition to the direct impact on the harvesting sector in terms of demand shifts for regional products and reductions in variability in demand, ancillary benefits were also generated by the program. These included renewed market and business contacts, increased sales of other seafood products, the establishment of linkages to more distant markets, and the increased probability of success for future programs.

The warm waters of the Gulf and South Atlantic combined with the small, oily nature of many of the finfish species, have created unique handling and storage problems for the commercial industry. Many of these resources were never fished because of these impediments and little information or experience has, therefore, been available. A basic problem in the production of coastal herring, groundfish and nearshore species for human consumption is the need to economically handle and deliver very large quantities of fish in good condition in high water temperature situations.

The S-K Program has funded research to address such questions as at-sea handling, off loading systems, shelf life studies, and product development. One example is a project that developed an integrated handling technology system, including design, construction and operation of an on-board refrigerated seawater system. Development of the brine refrigeration system allowed fishermen to handle large volumes of low-value fish while maintaining consistently high product quality. Moreover, the time and expense of travel to and from port were reduced substantially, thus increasing the range of fishing activity and lowering production costs.

It is estimated that approximately 10 new purse seine vessels have entered the Gulf fishery for coastal herring. The resulting increase in dockside value of herring production is estimated at approximately $1 million a year. The total effect on gross regional output using conventional multipliers for this industry would range from $10 to $12 million. Adoption of this technology in other fisheries, e.g., the by-catch of the shrimp trawl fishery, has generated further increases over

historic values. An economic analysis of these benefits suggests a net increase in output of $4 million in landings and $10 million in seafood product shipments from the Gulf coast.

Menhaden. The menhaden purse seine fishery, with landings of 2.4 billion pounds in 1986 and a dockside value of $93.8 million, is the single largest commercial fishery resource in the region. This fishery accounts for 40 percent of the total volume of U.S. commercial landings annually.

Both the Atlantic and Gulf menhaden stocks are considered fully utilized in fishmeal and oil production. Fishmeal has been used both domestically and internationally as the primary source of amino acids in livestock feed rations. The oil is used primarily in the manufacture of oleomargerine in Europe. The development of new products for direct human consumption for both the U.S. and foreign markets is considered the key to declining demand for both fishmeal and oil in traditional markets. The S-K Program has played a major role in fostering research to modify and upgrade the use of menhaden.

Early results from an S-K funded menhaden surimi project indicate that a variety of products with desirable functional properties can be made from menhaden ranging from mince to high grade surimi. Some of these products may be capable of partially or fully substituting for pollock or other commercially available surimi in the manufacture of seafood analogue products and many other foods. This will depend upon production cost comparisons and technical considerations that are currently under investigation. Although further work must be conducted to assure that consistent quality can be economically produced in commercial quantities, the initial project results answer affirmatively a major technical question as to whether menhaden might be a suitable species for surimi production. At a time when the domestic demand for fishmeal from menhaden has been falling because animal feed blenders have been able to formulate feed using cheaper grain protein sources with synthetic amino acid supplements, menhaden surimi appears moderately encouraging. A modest increase in the value from this resource would have a significant impact on the entire region, given the vast scale of menhaden production.

Surimi research has been conducted on other species in the Southeast, as well. A surimi processing line funded by S-K was successfully operated at Bayou La Batre, Alabama, producing the first commercially acceptable surimi in the U.S. About 250 tons of high quality surimi from croaker was produced, almost all of which was sold at competitive prices to Japanese firms. The high surimi quality was evident since kamaboko made from Gulf croaker surimi produced at Bayou La Batre was the

first ever U.S. entry and winner of one of seven major prizes in the annual all-Japan kamaboko contest. Over 400 Japanese surimi manufacturers were entered. Unfortunately, the traditionally abundant croaker resource collapsed due to natural causes just as the results of the research became evident.

The plant was used over a four-year period to demonstrate and screen other candidate species by examining their gel forming ability. Initial results on menhaden, red hake and other species led to further research to fully test the technical and economic feasibility of processing surimi from these species at near commercial levels.

The use of menhaden oil for human consumption is discussed in the "National" section.

Shrimp. The Gulf of Mexico and South Atlantic shrimp fishery is the most valuable in the U.S., producing almost 327 million pounds in 1986 valued at $622 million at the ex-vessel level. The industry is plagued, however, by a series of problems. Biological abundance has varied over the last decade between 194 and 327 million pounds. High production years attract new investment in added vessels and in the efficiency of existing vessels. The annual biological yield is being spread each year among more vessels with a declining catch per unit of effort as a result. Also, the U.S. shrimp fleet has been excluded from many traditional foreign fishing grounds in recent years, particularly off the coasts of Mexico and the north coast of South America. The industry has been characterized by "boom-or-bust" cycles. Spiraling vessel insurance costs and high costs of capital on top of sharply increased fuel costs in the mid to late 1970's reduced the ability of individual firms to support research to develop alternate fisheries or to investigate more efficient harvesting practices. Another problem plaguing shrimp fishermen is the incidental catch of sea turtles in shrimp nets.

The recent commercialization of shrimp aquaculture in Central and South America and the development of successful analogue products and shrimp substitutes have a growing impact on the shrimp fishery as well. The expected growth in imports of cultured shrimp will add to the U.S. shrimp supply and depress prices accordingly. To compete with imported shrimp, the U.S. industry must improve its product quality, marketing practices, and overall efficiency. The advent of analogue products made from surimi is also increasing competition in the marketplace for shrimp. As better shrimp substitutes are developed, analogue products are certain to have a significant economic impact on the price of shrimp in the future. Efforts

by the Food and Drug Administration to limit the use of bisulfites in shrimp processing, as well as other potential regulatory actions, will further increase shrimp production costs.

S-K funded projects have already addressed many of these issues. A project investigating alternatives to current insurance underwriting practices has been conducted in cooperation with the fishing industry of the Southeast and coordinated with related S-K projects nationwide. Early results suggest that voluntary vessel safety programs, in conjunction with imaginative group insurance schemes, may provide relief to the problems of high costs or even unavailability of insurance for those willing to improve risk management practices. A project is also underway to produce a video educational program for Gulf and South Atlantic shrimp vessel owners, operators, and crews.

The brine refrigeration system discussed earlier reduced the average fuel consumption of shrimp vessels by 15 percent per day. Moreover, when markets are available, the ability to retain the entire shrimp catch in brine eliminates expensive on-board grading and sorting activities.

S-K funds have been used to accelerate the adoption of turtle excluder devices (TEDs) in the southeast shrimp fleet. The primary function of the TED is to reduce sea turtle mortality, but a major side benefit may be the ultimate reduction of by-catch and shrimp trawling costs. To date about 125 TEDs have been distributed for demonstration purposes with S-K funding. Other activities include TED training workshops for fishermen and net makers, the provision of various TED designs for industry education and use, and the testing of other, additional TED devices.

Other projects have addressed hazards associated with bisulfites in preserving fresh shrimp and in the development of alternative preservation products and practices. An acceptable protocol for determining the net weight of frozen shrimp was also developed with S-K funding, to provide a higher level of shrimp user protection.

Molluscan Shellfish. The Southeast molluscan shellfish industry (oysters, clams, and scallops) is valued at over $600 million annually and is of major significance to the economies of many rural coastal communities. The water quality in shellfish growing areas is the principal factor influencing the marketability of molluscan shellfish because they are often consumed uncooked. To protect human health, harvesting of this important food supply is permitted by States only from high quality waters which must conform to rigid standards.

With S-K funding, a model was developed to predict the occurrence of adverse conditions that result in the pollution of oyster harvest areas. Two different approaches were determined to have promise in predicting coliform bacteria levels. These results should be useful for predicting coliform levels, the indicator organisms for more serious virus diseases, thus improving strategies for oyster harvest management.

Shellfish meats are often consumed raw, or only partially cooked, and, with few exceptions, the entire animal is consumed. Further, cooking does not eliminate all potential human health problems related to concentrations of heavy metals, pesticides or other contaminants. Using S-K funds, a more sensitive assay was developed for hepatitis A virus detection in environmental samples, including shellfish and shellfish growing waters. Work is also underway to evaluate depuration systems and their specific operating conditions for the elimination of hepatitis A virus, other enteric viruses, and indicator bacteria from experimentally contaminated Eastern oysters and hardshell clams.

The Gulf and South Atlantic region supplies between 70 and 80 percent of U.S. oyster production, valued at dockside in excess of $50 million. High bacterial counts associated with warm Gulf waters threatened to preclude these oysters from being shipped in interstate commerce. Routine procedures to validate the safety of questionable oysters required five days. Since oysters are highly perishable, delays awaiting assay results reduced quality and in some cases led to destruction of products which were, in fact, safe. A 24-hour test procedure virtually eliminating transportation delays was developed with S-K funding, saving producing and receiving States millions of dollars.

Other problems are being experienced in the marketing of shucked oysters. For example, there is no common understanding or agreement among industry firms, regulatory agencies, and consumers about the source, quantities, quality, and significance of free liquid in oyster containers. An S-K study was conducted to determine the amount of free liquid that occurs in raw products when packed under good manufacturing practice, considering such factors as geographic location and season. Data from this experimental work is now being analyzed.

Recent large increases in landings of calico scallops have revealed the lack of specific information on the relationship

between handling conditions, product quality and shelf life. Because of industry and public agency concern, better definition of these parameters was needed for quality maintenance as the production of calico scallops grew. A project on quality control in scallop production resulted in a quality control operations manual for the industry, along with a self-inspection guide to direct industry's efforts. An industry workshop was conducted to help accelerate the transfer of this vital information.

Marine Recreational Fisheries. The Southeast boasts significant marine recreational fisheries. It is estimated that the Gulf and South Atlantic account for over 55 percent of all retail purchases associated with marine recreational fishing in the U.S.

Recreational fishermen in the Southeast are heavily dependent on species which are currently being overfished or fully utilized by all the user groups. As a partial solution to this problem, a recreational fisheries development program has been instituted with S-K funding and other funding sources using the same strategy used in commercial fisheries development to increase the demand and use of a wider variety of underutilized species.

A pilot recreational fisheries project using Atlantic spadefish as a target underutilized species was initiated first, followed by a larger program with a list of target species including Atlantic bonito, jack crevalle, croaker, sea robins, triggerfish, sheepshead, skates, rays, amberjack and sharks. The best success to date seems to occur when existing tournaments are expanded to include one or more of the target species.

Of benefit to both commerical and recreational fishermen has been work associated with artificial reefs. Several S-K funded projects have evaluated the effectiveness of new and old artificial reef technologies throughout the Southeast region. Benthic reefs as well as various fish attracting devices were tested both for effectiveness and potential problems. Lessons learned from these studies are now being adopted by a wide variety of public and private reef construction organizations.

Also under S-K funding, a reef siting plan for the Gulf of Mexico is nearing completion. This effort is designed to help overcome delays in the permitting process while minimizing potential conflict among the various users of the marine environment. Conflicts concerned with shrimp trawling and navigation are receiving special attention.

Other Fisheries. S-K funding has supported research and development in a number of other fisheries. Deepwater finfish and crustacean resources in waters off Puerto Rico and the U.S. Virgin Islands were investigated, for example. As a result, small fisheries for various deepwater reef species and shrimp are now underway. Another project explored the potential for initiating a deep sea fishery for Golden Crab in the Gulf of Mexico. The work included development of basic harvesting techniques and the identification of stocks. A number of vessels have already begun to pursue this resource. Another project underway involves the coordination and monitoring of the rapidly expanding yellowfin tuna fishery.

S-K funding has also supported some highly successful gear research and development in the Southeast. Several innovative technical changes in the gear and fishing methods employed in the long-haul seine fishery have been developed and adopted by commercial fishermen. Also, a revolutionary bottom long line fishing system was developed for use in very uneven rocky bottoms which had heretofore been unfishable. This gear, with many local adaptations, has been widely adopted.

Northeast

Atlantic Demersal Finfish. Examination of estimates of optimum yield and U.S. harvesting capacity reveals no opportunity for increased landings in the Atlantic demersal finfish fisheries (cod, haddock, hake, whiting, etc). In fact, total landings have declined drastically over the past few years. Today, average landings approximate 200,000 metric tons, of which current processing practices yield only about 35 percent or 70,000 metric tons. A portion of the "waste" is used for products such as fishmeal and oil. There is, however, the opportunity to make greater use of the fish wastes, namely in new products such as pharmaceuticals, minced products, and fabricated foods such as surimi, to increase the return on the dollar.

With S-K assistance, technical and economic feasibility of red hake surimi production was explored. It was concluded that red hake can be processed into a quality surimi comparable to pollock surimi. Other undervalued species can be successfully blended with red hake. This results in a potential raw material base of 100,000 pounds daily, year round. Other work included a review of regulatory considerations for labeling new lines of food products and development of a proposed labeling program for surimi based products. The results of this project

provided a basis for the Food and Drug Administration to implement a uniform policy guideline for labeling analogues that is favorable to the surimi industry.

Fish waste processing has become the Achilles' heel of the New England seafood industry. As recently as 15 years ago, there were 11 fishmeal plants operating in New England. They used all the waste material from the region's fish processing plants, and produced meal and oil from menhaden as well. In 1986, only the plant in Rockland, Maine, was still operating. Primary causes for the decline were competition with soy bean products and importation of large volumes of fishmeal from foreign countries. Environmental concerns forced closure of one of the plants. At the Gloucester, MA, plant the volume of fish waste exceeded the capacity of the plant. Equipment failures also occurred, and a special permit for disposal at sea was requested and received from the Environmental Protection Agency. It was, however, only a temporary solution to a growing, serious problem.

To help turn fish waste utilization into a profit making activity for processors, a multi-year S-K project is investigating environmentally acceptable methods to convert fish waste into valuable by-products. Basic conclusions from the first year and one-half of this three-year resource recovery study indicate that: (1) Solutions to New England's fish waste disposal problem will likely involve many different technologies in many different locations. There is great variability in fish waste production and utilization from port to port within New England and small scale solutions are appropriate; (2) Profitable potential markets for fish waste-based products exist in several areas, including blended seafoods, pet food finisher, aquaculture feed, fertilizer and weaner foods for young livestock; (3) Individual processors can profitably convert a portion of the fish waste stream to minced fish. By building facilities geared to the production capacity of their plants, processors can economically produce mince for the blended seafood market; (4) Composting of fish waste with peat has the potential to be an economic and environmentally acceptable method of disposal; and (5) Large and profitable markets may exist for fishmeal as a component in cattle feed and other ruminant feeds due to its value as a growth enhancer. Industry members and government agencies in other parts of the country are benefiting from information developed by this project. Further scientific studies are being conducted to follow up on work started by this fish waste project.

A great deal of S-K effort has been devoted to seafood quality projects in New England and the Mid-Atlantic to

introduce higher quality fish handling to reduce waste and improve shelf life in a supply constrained resource. An example is an innovative quality program involving 28 New England draggers who learned state-of-the-art techniques for bleeding fish, boxing them on board, along with improved fishing methods. These techniques have long been used by Icelandic, Norwegian and Danish whitefish producers, helping them to produce high quality products and enabling them to dominate the U.S. market for whitefish fillets. The New England fishermen who participated in this S-K effort found that the quality technique they learned dramatically increased yield and shelf life of their catch, and improved their profits significantly. They were able to compete successfully in a highly competitive market.

A quality maintenance program for fresh fish products from the Mid-Atlantic region demonstrated that if fresh fish is handled properly, shelf life can be extended up to 12 days and Midwest markets can be expanded.

Another project resulted in development of a manual on the selection of refrigeration and insulation for fishing vessels to maintain high product quality. As a guide in "taxonomic" format, it is easy to read and valuable to fishermen seeking to upgrade their vessel capabilities.

Several projects are underway which relate innovative gear technology to resource conservation. One project will develop and demonstrate selective fishing gear to reduce habitat destruction and provide escapement for juveniles and non-target species by-catch. Other projects will develop a towed gear observation system and demonstrate a prototype shrimp separator trawl.

Squid. Given an optimum yield estimate of 74,000 metric tons and a present U.S. harvest estimate of 24,000 metric tons of squid (Loligo and Illex combined), U.S. harvesting capability could theoretically be expanded by 50,000 metric tons. Some additional increase above the 24,000 metric ton level will undoubtedly be realized in the near future with the advent of U.S. catcher/processing vessels.

Major problems impeding squid development have been related to product quality, gear technology, shoreside processing, domestic markets, and stock assessment in certain areas. Product quality is of particular concern to the harvesting of Illex squid, a summer fishery.

Freshly caught squid deteriorates rapidly unless properly refrigerated, and most vessels do not have adequate holding

facililties. Shoreside facilities have not been developed with the proper technology to insure maintenance of high quality, and the rapid and consistent processing of the raw product. Specifically, needs include refrigeration, waste disposal, and mechanized processing systems, such as those which exist in other countries.

Markets have developed slowly for squid, and considerable domestic and export market expansion is needed to support additional investment in harvesting and processing.

With S-K assistance, procedures were demonstrated to improve the quality of squid catches through storage in refrigerated and chilled sea water systems as opposed to the traditional method of storage on ice. Results indicated that both systems consistently produced better quality squid in terms of physical and sensory properties than did traditional icing methods.

Gear technology projects have demonstrated that pair trawling for squid, butterfish and other species not only increased catches and productivity, but reduced fuel costs. Squid jigging was also successfully demonstrated to fishermen as was squid mid-water trawling.

An S-K project analyzed the feasibility of mechnically drying Loligo and Illex squid for domestic and export sales. The findings indicated that mechanical dryers work for both species, tastes compare favorably with Hong Kong samples, and species are interchangeable in recipes. Further, profits seem possible using mechanical dryers, and there is a significant possibility for marketing dried U.S. product.

Another S-K project provided a financial and marketing evaluation for dried squid using a computer model. The research identified markets for dried squid in far Eastern countries. Findings were: (1) it is possible to build an adaptable simulation model of a mechnical drying plant, and that production rates, profit margins, interest rates, inventory control and Canadian competition can be successfully modeled, and (2) there is a potential export market for dried squid. The report details prices, product quality, financial considerations for investment in such a facility, and time for payback of the investment under multiple assumptions.

A project in the Mid-Atlantic concentrated on domestic marketing of vast quantities of Illex squid tubes and strips. Work included test marketing of squid products in both institutional and retail markets.

Squid marketing is also included in a major mixed species market development project being conducted in the Northeast. This effort involves working with all sectors of the seafood industry from fishermen to consumers in developing stronger markets for abundant yet undervalued species.

One barrier to export of squid products has been the lack of international product standards. Through the Codex Alimentarius, the U.S. is now using S-K funds to develop these standards. S-K funds were also used to study the Spanish market for squid, along with Spanish government policies and regulations relating to squid.

Mackerel. Given an optimum yield estimate of 101,700 metric tons and a 1986 U.S. harvest of 9,210 metric tons for Atlantic mackerel, tonnage available to support U.S. growth totals approximately 92,490 metric tons. A portion of the possible increased harvest could be realized by marine recreational fishing interests.

The increased utilization of mackerel hinges on two factors, entering existing markets and developing new markets. Existing markets are primarily in foreign countries, whereas the development of new markets may be in both foreign countries and the U.S. Although extensive marketing efforts have been directed toward mackerel, the harvest has remained stable. It appears that the key to full utilization of the mackerel resource in the future will depend on development of new product forms such as surimi.

Coastal and Estuarine Fisheries. The coastal and estuarine fisheries in the Northeast are important for their yield and value. For example, in 1986 total landings of finfish and shellfish, excluding lobster, taken within three miles of the shore were 174 million pounds valued at about $143 million.

Factors affecting the traditional inshore fisheries include: decline in stocks, in part related to pollution; displacement of older, smaller vessels by new freezer trawlers; movement of the fleet inshore from offshore in New England as a result of the Georges Bank boundary decision; commercial and recreational user conflicts; and closure of some fisheries in some areas, e.g., striped bass in Maryland. Strategies to resolve the problems must include exploring the possibility of shifting into some currently underutilized species; improving quality through education and experimentation with alternative market forms; assisting in developing gear and rigging to assure multi-species or alternative operations; and resolving commercial-recreational user conflicts.

Focusing on both familiar and unfamiliar species in the Mid-Atlantic, ambitious domestic marketing and consumer education projects have been supported with S-K funds. Activities include more than 500 educational seminars for teachers, home economists, extension agents, and retail meat managers, and more than 300 television and radio programs and seafood demonstrations. These activities have resulted in more than $20 million worth of free publicity for seafood. A directory of Mid-Atlantic seafood processors was also produced and distributed extensively throughout the Northeast region and the Midwest.

Another significant accomplishment was an Economic Prospectus and Five-Year Development Plan for the Mid-Atlantic region. It is being used to educate the financial community about the development potential of the fishing industry. It also serves as a planning document for the entire Mid-Atlantic region to follow in developing the fishing industry effectively and realistically.

Several projects have dealt with the acute problem of crab waste in the Chesapeake Bay area. In one case, meal production was determined to be an economically viable alternative. In another, the results sucessfully indicated that greater usable meat yields could be achieved by placing the "picked" shell through a deboning machine and formulating the residue into several new products.

Ongoing projects will characterize the utilization of wastes from ocean quahog and surf clam processing plants, and determine the feasibility of modeling the use of New Jersey salt marshes to treat clam processing waste waters to reduce the amount and cost of in-plant conventional treatment necessary to achieve state effluent standards.

Marine Recreational Fisheries. Several recreational fisheries projects have been supported by S-K funds in the Northeast. A notable example addressed marketing strategies for the New England party boat, charter boat, and rental fishing boat industry. The project included the preparation and presentation of seminars for the tourism/travel industry and local governments on the role of the industry; analysis of current industry marketing methods and strategies; and the development and presentation of a marketing plan to assist industry associations and members.

Great Lakes Fisheries. Increased use of underutilized freshwater species is essential to the stabilization of economic yield in the Great Lakes because of depleted stocks of

traditional freshwater species. Curtailment of commercial harvesting of traditional freshwater whitefish species to allow a rebuilding of the stocks has caused a serious drop in harvesting, processing and employment in the Great Lakes. The commercial fisheries of the rivers, inland lakes and impoundments of the U.S. are the source for millions of pounds of carp, buffalo, suckers, paddlefish and other species that have never been harvested intensively because of inadequate markets. For example, a rough fish fishery (principally carp) on Lake Winnebago in Wisconsin could probably triple production (now between six and seven million pounds per year) if new markets could be created.

Emphasis has been placed through S-K on development of Great Lakes fisheries using a market driven approach. Promotional and educational compaigns have covered both domestic and foreign markets. Included have been product development efforts to identify uses for minced or surimi products that are acceptable to consumers and test market the products.

The first product developed was a "sausage" from the minced flesh of suckers or freshwater mullet. A series of in-store demonstrations were conducted to introduce this new product, which was favorably accepted. Indications are that a good market can be developed for this product. The retail price was found to be very competitive and allows the fisherman, processor, distributor and retailer, respectively, to make reasonable profits.

In recent years, Fishery Administrators in several Great Lakes States have promoted the development of sport fisheries for salmon and lake trout. Each year additional restrictions were placed on commerical operators to encourage further expansion of sport fishing. An S-K project focused on efforts that could be undertaken to ensure a cooperative rather than a competitive fishery. Identified were 14 projects designed to lessen tensions between sport and commercial factions and ensure a continuing supply of fish for the consumer. Progress is being made on these projects.

Generic/National Projects

Many problems addressed by the S-K Program are not species specific. These have been addressed at the national level because they are generic by nature in that they cross cut regional boundaries and/or relate to more than one fishery. In

many cases, regional projects have also contributed to solving generic problems and are included in the following discussions.

Seafood and Nutrition. A major generic problem has been a lack of general acceptance of seafood by U.S. consumers as a regular part of their diet, as is the case with most meat and poultry. Much of this has been due to the consumers' lack of familiarity with the nutritional value and variety of seafoods available and the many ways they can be prepared and enjoyed. Therefore, a key role of the S-K Program has been to develop and disseminate needed consumer information on seafood availability, handling, storage, cooking, and nutritional value. These activities, and the exciting new scientific evidence on the unique health benefits of omega-3 fatty acids which occur mainly in seafood, all work hand-in-hand towards increasing consumer acceptance of seafood. A number of S-K supported studies both regionally and nationally have contributed to the growing body of evidence that these fatty acids play a direct role in the prevention and amelioration of cardiovsacular disease.

S-K funds also made possible a landmark conference on seafood and health in 1985. That conference, held in Seattle, brought together for the first time key researchers and clinicians studying the beneficial effects of seafood on human health, along with nutrition educators, dietitians, journalists, and representatives from the seafood industry. The conference proceedings were published for distribution.

In another area, significant opportunities exist in the U.S. for the use of fish oil as an added ingredient in cooking oils and shortenings. Such direct food use of fish oil will, however, require Food and Drug Administration (FDA) approval. Through S-K assisted research, fish oil was demonstrated safe for such use. Market research on the potential demand for fish oil was also performed. Based on these S-K studies, the FDA is currently considering an industry petition for the GRAS (generally recognized as safe) affirmation of fish oil in direct food use.

Product Quality and Safety. Many S-K projects have successfully addressed a number of concerns regarding the quality and safety of fishery products which have traditionally plagued the industry's product image. For example, S-K funds were used to conduct research to develop an improved, commercially applicable, automated inspection system for the detection of defective cans containing salmon; develop and field test a detection kit for paralytic shellfish poisoning; reduce processing requirements to inhibit botulism in vacuum packed smoked fish; and detect ciguatoxin in fish.

S-K funds also supported an investigation of the potential effects of instituting a uniform, national inspection program for fish and seafood under several options by describing the experiences of U.S. and foreign inspection programs and by estimating the possible costs and benefits of a U.S. seafood inspection program. This preliminary analysis will provide policymakers with objective and timely information that will be helpful in the debate over the proper roles of Government and industry in fish and seafood inspection.

New Product Concepts. As discussed in the regional sections of this report, new product forms such as minced fish and surimi offer tremendous opportunities for the expansion of the U.S. industry. These opportunities are often not limited to individual fisheries. S-K sponsored research has shown that surimi can be cost-effectively produced from nearly a dozen species. Certain generic aspects of surimi product development were addressed as national S-K projects -- an international symposium on structured seafoods, assessment of hyperfiltration technology to recover proteins from surimi process waters, and an investigation of the nutritional equivalency of surimi-based products to their natural seafood counterparts.

Excellent progress is being made in a multi-year project to develop and implement a Seafood Products Identification System complete with a machine readable Universal Products Code (UPC) numbering system for random weight seafoods. When completed, the results of this project will: provide industry with a Seafood Products Identity Manual to facilitate uniform labeling practices throughout the industry; provide UPC numbers for all seafood products for use by brokers and retailers; and provide a guide of market names for all finfish, shellfish, and processed seafood products marketed in the U.S. for use by Federal, State, and local government agencies.

Domestic Marketing. Domestic marketing efforts were continued from 1982 through 1986. Seafood exhibits were strategically planned, located and conducted at national food industry shows. Seafood promotional materials were developed and distributed, and training and related assistance to retailers in marketing practices were conducted.

A unique domestic marketing program parlayed a few hundred thousand dollars worth of S-K money into an estimated $30 million worth of publicity for fish and seafood products. The program, called "Catch America," enabled industry and government to join together in promoting a wide range of seafood products, and, ultimately, to expand domestic consumption of fisheries products. These efforts included

public service announcements, news editor materials, workshops, in-store demonstrations and restaurant and retail personnel training.

Export Marketing. Import/export ratios of U.S. seafood have continued to increase despite a decrease of foreign fishing effort in U.S. waters. In part, this is because U.S. producers have not been export oriented due to their small entrepreneurial nature. Foreign buyers have traditionally had little exposure to U.S. products and both U.S. producers and foreign buyers have faced inconsistent and sometimes unknown international product quality standards. U.S producers have been unable to afford the risky ventures necessary to compete with foreign importers of processed seafoods (e.g., surimi). Opportunities for improvement abound. Currently, the U.S. imports twice the total U.S. commercial landings of seafood. The U.S. fishery product import/export ratio was 5.6 to 1 in 1986.

Through S-K funding, export marketing efforts were conducted at the national level, which were coordinated with regional export marketing activities. Included were a comprehensive analysis of U.S. market opportunities and development of a basic guide for exporting. This was later augmented by export guides to selected European markets. U.S. seafood exhibits at international trade shows were planned and managed. The benefits from U.S. participation in these sales events have been calculated to exceed 10 times the cost of participation.

Vessel Safety and Insurance. Rising vessel insurance costs reached crisis proportions in almost every fishery in the U.S. in the early 1980's. Profit margins were severely impacted and some vessels were forced out of business. Closely linked to insurance costs are vessel safety issues. Increasingly high awards and settlements in indemnity claims for personal losses have been identified as major factors in the rising cost of vessel insurance. In 1986, annual premiums in excess of $100,000 per vessel were not uncommon. Many opportunities exist both nationally and regionally to promote vessel safety and reduce insurance costs.

S-K funds were used to develop safety training programs, vessel safety codes and manuals, establish marine safety and survival instructors, and study the impact of fisheries management regulations on vessel safety. A multi-year project to assess alternatives to traditional insurance underwriting practices, update the statistical data base used by actuaries, and coordinate vessel safety programs was begun in 1985 with

some early success. For example, fishery cooperatives have been started in Texas, Florida, North Carolina, New Jersey and Massachusetts. These have shown promise in reducing insurance costs for their members.

Marine Recreational Fisheries. Many opportunities for growth exist within the marine recreational fishing industry which is generally constrained by its lack of organization and central business focus. The manufacturing component is one of the few organized entities of the entire industry. Currently, the fishing tackle import/export ratio, however, is eight to one. A real opportunity exists to increase current exports (about $130 million in 1986) with a focused, assertive export program by U.S. companies. Through S-K funding, a practical guide to fishing tackle exporting was developed and distributed to manufacterers. Analysis of export opportunities in Western Europe, Japan and Australia is also in progress.

Artificial reefs have been demonstrated as both effective fish aggregrators and as biomass enhancers. In the past, reef location and construction have been relatively piecemeal, localized, and poorly planned. Through the use of S-K funds, a National Artificial Reef Development Center was developed. The Center serves as a national focal point for artificial reef development. Coordination and development of reef activities through the Center offers the promise of significant growth in amount and accuracy of information disseminated on reefs, catch per unit of effort, reduction of commercial and recreational conflict, and better planned location of reefs in proximity to anticipated growth of support services and facilities.

VIII. FUTURE DIRECTIONS

In the past, the S-K Program has addressed marketing and promotion activities which are essential to the fisheries development process. Indeed, much of the fishing industry's success in developing our Nation's vast underutilized fisheries resources has been due to S-K supported marketing efforts. However, a new mechanism has been established to fund fish and seafood marketing activities.

The National Fish and Seafood Promotion Act of 1986 (FSPA) created a National Fish and Seafood Promotional Council which will develop annual plans and budgets for generic marketing and promotion of fisheries products, including consumer education, research, and other activities of the Council, such as funding referenda to establish any product-specific councils formed

under the Act, and coordinating their activities. Funding for this Council will be primarily through monies transferred from the Saltonstall-Kennedy Fund ($750,000 in FY 1987; $3 million each in FY 1988 and FY 1989; and $2 million in FY 1990). These funds are separate from those in the S-K Grant Program. The Council consists of the Secretary of Commerce or his designee, who is a non-voting member, and 15 voting members appointed by the Secretary for a term of four years.

The FSPA also provides for the establishment of product-specific seafood marketing councils to conduct product-specific promotion, including consumer education and research. They may also develop seafood quality standards for fish or fish products. These councils will be funded through assessment of segments of the industry represented on the councils. These councils will be established through: (1) application of particular segment(s) of the industry to the Secretary for a charter; (2) favorable review of the charter by the Secretary, and (3) successful conduct of a referendum by the Secretary on the proposed charter. The appointments to the product-specific councils will be made by the Secretary.

NOAA will continue to work with the fishing industry in the future to develop funding priorities for the S-K Program that will address problems and opportunities in fisheries research and development. The focus will be on long-term, high risk research that the industry would have difficulty conducting without government assistance.

APPENDIX I

APPENDIX I

Information regarding the Saltonstall-Kennedy Grant Program may be obtained from the following offices of the National Marine Fisheries Service:

Director, Office of Trade and Industry Services
National Marine Fisheries Service
Washington, DC 20235
Telephone: (202) 673-5371

Chief, Industry Services Staff
National Marine Fisheries Service
P.O. Box 1668, 709 West Ninth Street
Juneau, Alaska 99802
Telephone: (907) 586-7224

Chief, Fisheries Development Division
National Marine Fisheries Service
BIN C15700, 7600 Sand Point Way, NE
Seattle, Washington 96115
Telephone: (206) 526-6117

Chief, Fisheries Development Division
National Marine Fisheries Service
300 South Ferry Street
Terminal Island, California 90731
Telephone: (213) 514-6686

Chief, Fisheries Development Division
National Marine Fisheries Service
9450 Koger Boulevard
St. Petersburg, Florida 33702
Telephone: (813) 893-3271

Chief, Services Division
National Marine Fisheries Service
P.O. Box 1109
Gloucester, Massachusetts 01930
Telephone: (617) 281-3600

APPENDIX II

1982 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
Alaska Region			
1. Model Whitefish Processing Plant	Alaska Fisheries Development Foundation Anchorage, AK	$548,825	$195,000
2. Demonstration Longliner - Processor Aleutian Mistress	Alaska Fisheries Development Foundation Anchorage, AK	123,825	95,200
3. Sablefish Market Development	Alaska Fisheries Development Foundation Anchorage, AK	186,325	123,500
4. Octopus Fishery in the Aleutian Area	Alaska Fisheries Development Foundation Anchorage, AK	70,825	22,000
5. Hydraulic Clam Dredge	Alaska Fisheries Development Foundation Anchorage, AK	123,325	76,000
6. Quality and Preservation of Alaska Groundfish	Alaska Fisheries Development Foundation Anchorage, AK	85,725	21,000
7. Canned Pollock Marketing Test	Alaska Fisheries Development Foundation Anchorage, AK	93,225	19,100
8. Atka Mackerel Product Evaluation	Alaska Fisheries Development Foundation Anchorage, AK	187,825	130,600
9. Pacific Salmon Export Development Program	Alaska Seafood Marketing Institute Juneau, AK	302,825	254,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Match
Northwest Region			
10. Design and Demonstrate a High Pressure Injection Machine	West Coast Fisheries Development Foundation Portland, OR	$55,000	$53,562
11. Utilization of Minced White-Fleshed Fish as an Ingredient in Baby Foods	West Coast Fisheries Development Foundation Portland, OR	31,500	30,000
12. West Coast Domestic Marketing Program Advisory/ Extension Activities	West Coast Fisheries Development Foundation Portland, OR	577,000	259,000
13. Fishermen's Wives Consumer Education and Marketing Project	West Coast Fisheries Development Foundation Portland, OR	65,000	43,250
14. Evaluation of Fish Silage for Improving the Nutritional Value of Low Quality Feeds for Cattle	Washington State University Pullman, WA	35,000	17,214
15. Fish Waste Utilization - Fish Oil/Fertilizer	Fruit Builder, Inc. Entiat, WA	50,000	34,000
16. Increasing Per Capita Consumption of Locally Caught Trawlfish through School Lunch Programs and In-School Education	Newport Fishermen's Wives Newport, OR	42,000	42,000
17. Development of a Puget Sound Scallop Fishery	Washington State Department of Fisheries Olympia, WA	45,000	19,285
18. Disposal of Seafood Waste to Enhance Recreational Fisheries on the Umpqua River Estuary, Oregon	Oregon Department of Fish and Wildlife Portland, OR	95,000	50,000
19. Commercial Fishing Technology Program	Southern Oregon Community Coos Bay, OR	45,000	35,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
20. Public Education Program for the Recreational Shellfish Fishery	State of Washington Department of Fisheries Olympia, WA	$45,000	$19,286
21. Evaluation of Habitat Enhancement and Fish Aggregating Technologies in Washington's Developing Coastal Recreational Fisheries	State of Washington Department of Fisheries Olympia, WA	50,000	34,803
Southwest Region			
22. Purse Seine Operations in the Northwest Hawaiian Island Chain, Ponape and Truk, and the Federated States of Micronesia	Pacific Fisheries Development Foundation Honolulu, HI	717,400	167,530
23. Fresh Fish Market Orientation and Fish Handlers Training, Guam	Pacific Fisheries Development Foundation Honolulu, HI	35,000	40,271
24. Trochus Reseeding for Commericial Exploitation, Palau	Pacific Fisheries Development Foundation Honolulu, HI	34,350	35,972
25. Saipan Commercial Fishery Facility Project	Pacific Fisheries Development Foundation Honolulu, HI	75,000	31,572
26. Static Fishing on Aggregation Devices	Pacific Fisheries Development Foundation Honolulu, HI	32,000	47,071
27. Truk Lagoon Bait Production Industry	Pacific Fisheries Development Foundation Honolulu, HI	18,000	36,500
28. Economics of Baitfish Production of Economic Development Maui County	Department of Economic Development Kahului, HI	35,000	35,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Match
29. Development of a U.S. Albacore Fishery	American Fishermen's Research Foundation San Diego, CA	$150,000	$150,000
30. Small-Scale Tuna Longlining Around Guam	Frank Cushing and Son Enterprises Agana, Guam	17,152	5,825
31. Seafood Market Development in California	West Coast Fisheries Development Foundation Portland, OR	50,000	15,000
Southeast Region			
32. Exploratory Fishing and Resource Studies	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	505,000	320,000
33. Handling, Storage, and Technology Studies	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	100,000	40,000
34. Product and Market Concept Development	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	150,000	130,000
35. Foreign and Domestic Market Investigations	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	250,000	200,000
36. Advisory/Extension Activities	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	80,000	10,000
37. Surimi Plant, Northern Gulf of Mexico	Nichibei Fisheries, Inc. Bayou La Batre, AL	110,000	110,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Match
38. Virgin Island Fishery Development and Demonstration Project	Government of the Virgin Islands St. Thomas, VI	$50,000	$50,000
39. Evaluation of Existing Artificial Reefs, Enhanced by Means of Mini-Fish Aggregating Devices	MACENT, Inc. Ft. Lauderdale, FL	47,200	22,475
40. Evaluation of Fishing Piers Enhanced with Fish Aggregating Devices	MACENT, Inc. Ft. Lauderdale, FL	59,950	34,850
Northeast Region			
41. Development of Surimi Based on Red Hake	New England Fisheries Development Foundation Boston, MA	91,200	90,000
42. Upgrade and Maintain Fish Quality	New England Fisheries Development Foundation Boston, MA	355,200	350,000
43. Intensive Market Program for New England	New England Fisheries Development Foundation Boston, MA	240,400	200,000
44. Market Information Systems and Services, Frozen Fishery Products - Western Europe	Development Planning and Research Associates Manhattan, KS	191,013	86,928
45. Feasibility of Commercial Fishing Operations in the Mid-Atlantic Continental Slope	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	70,370	69,700
46. Mid-Atlantic Domestic Consumer Education and Export Marketing	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	214,972	207,000
47. Program to Develop New Markets for Underutilized Species of Freshwater Fish	Great Lakes Fisheries Development Foundation Great Haven, MI	40,000	10,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
48. Recreational Fishery for Large Offshore Pelagic Fishes of the Mid-Atlantic Coast	New Jersey Bureau of Marine Fisheries Trenton, NJ	$32,000	$8,000
National Projects			
49. Development Opportunities in Recreational Fisheries	Sport Fishing Institute Washington, DC	133,866	33,466
50. Ciguatera Impact on Fisheries	Medical University of South Carolina Charleston, SC	245,950	61,488
51. Increase Consumer Awareness Concerning Health and Nutritional Aspects of Fish and Seafood Products	National Fisheries Education and Research Foundation Washington, DC	280,000	70,000
52. Fish Oil for Human Consumption	National Fish Meal and Oil Association Washington, DC	266,000	117,000
53. Audio-Visual Seafood Training Program for Retailers	National Fisheries Education and Research Foundation Washington, DC	62,000	35,000
54. Analysis of Seafood Consumption Patterns	Pennsylvania State University University Park, PA	63,858	15,965
55. U.S. Seafood Exhibit at the 1983 ANUGA Trade Show	Alaska Fisheries Development Foundation Anchorage, AK	183,120	195,000
56. Basic Guide to Seafood Exporting	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	14,500	14,000

1982 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
57. Quality Assurance and Product Safety - Salmon	National Food Processors Association Washington, DC	$171,676	$78,324
58. Competition and International Seafood Markets: An Analysis of Unfair Trade Practices	Robert J. Harmon and Associates, Inc. Washington, DC	89,300	28,000

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
Alaska Region			
1. Pollock Industry Development	Alaska Fisheries Development Foundation Anchorage, AK	$1,644,123	$1,167,500
2. Minced Pollock Pilot Project	Alaska Fisheries Development Foundation Anchorage, AK	143,715	105,000
3. Groundfish (Whitefish) Marketing	Alaska Seafood Marketing Institute Juneau, AK	100,000	99,675
4. Sablefish Market Development	Alaska Longline Fishermen's Association Anchorage, AK	132,500	52,215
Northwest Region			
5. West Coast Seafood Marketing Program	West Coast Fisheries Development Foundation Portland, OR	540,000	270,000
6. White Fish in the Diet & Plasma Cholesterol Level	West Coast Fisheries Development Foundation Portland, OR	18,000	12,000
7. Assessment of Fishery Potential for *Loligo Opalescens*	West Coast Fisheries Development Foundation Portland, OR	60,000	17,467
8. Development of an Oregon Squid Fishery Market	Southwestern Oregon Community College Coos Bay, OR	70,000	65,000
9. Development of a Washington Squid Fishery	Washington State Department of Fisheries Olympia, WA	41,493	17,603
10. Public Education Program for Recreational Shellfish Fishery	Washington State Department of Fisheries Olympia, WA	26,060	11,200

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
11. Evaluation of Habitat Enhancement and Fish Aggregation Technology in Washington's Developing Coastal Recreational Fisheries	Washington State Department of Fisheries Olympia, WA	$67,900	$51,800
12. Seafood is Heart Food Seafood Education Project	American Heart Association of Washington Seattle, WA	70,000	37,812
13. Evaluation of the Haul Seine for Commercial Shad Harvest - Columbia River	National Environmental Service, Inc. Lancaster, PA	36,580	14,000
14. Economic Viability of Harvesting Red and Purple Urchin	Oregon State University Corvallis, OR	40,982	12,000
Southwest Region			
15. Trochus Reseeding and Production of Giant Clams, Palau	Pacific Fisheries Development Foundation Honolulu, HI	90,000	57,000
16. Western Pacific Transshipment Study	Pacific Fisheries Development Foundation Honolulu, HI	33,368	9,697
17. Truk Shipyard Feasibility Study	Pacific Fisheries Development Foundation Honolulu, HI	36,437	8,401
18. Fish Handling, Processing and Market Training, American Samoa	Pacific Fisheries Development Foundation Honolulu, HI	50,787	18,169
19. Topminnow Test Fishing, Hawaii	Pacific Fisheries Development Foundation Honolulu, HI	7,000	7,000

1983 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
20. Squid Exploratory Fishing California	West Coast Fisheries Development Foundation Portland, OR	$90,800	$52,250
21. Alternative Processing and Marketing for Albacore and Mahi Mahi	West Coast Fisheries Development Foundation Portland, OR	45,700	45,700
22. Develop Alternative Products from Under-utilized Species	West Coast Fisheries Development Foundation Portland, OR	21,820	15,000
23. A Machine to Sort Squid by Sex and Size	West Coast Fisheries Development Foundation Portland, OR	46,596	31,124
24. Development of U.S. Albacore Fishery	American Fishermen's Research Foundation San Diego, CA	24,000	24,000
25. Develop Domestic Albacore Markets	Western Fishboat Owners Association San Diego, CA	100,000	100,000
26. California Seafood Promotion and Education Program	Lee Associates, Inc. Western Research Kitchen Los Angeles, CA	88,685	26,000
27. Administration/Management Support	Pacific Fisheries Development Foundation Honolulu, HI	166,426	47,000
28. Market Potential for Pacific Roe Herring	University of California Santa Rosa, CA	14,474	6,300
29. Economic Study and User Value Safety of the Marine Recreational Fishery in Southern California	National Coalition for Marine Conservation San Diego, CA	24,540	10,517

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
30. Hawaii Seafood Promotion Program	B.T. Associates Honolulu, HI	$15,000	$4,350
31. Small Scale Tuna Longlining Around Guam	Frank Cushing & Son Enterprises Agana, Guam	15,000	10,980
32. Abalone Fisheries Research	California Sea Farms Santa Barbara, CA	80,628	56,000
Southeast Region			
33. Exploratory Fishing and Resource Studies	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	525,000	320,000
34. Foreign and Domestic Market Investigation	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	350,000	200,000
35. Product and Market Concept Development	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	150,000	130,000
36. Handling, Storage and Transportation Studies	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	100,000	40,000
37. Finished Products Made from Surimi	Billy Thrash Bayou LaBatre, Al	40,000	27,867
38. Institutional Food Service Use of Seafood	Florida Department of Natural Resources Tallahassee, FL	15,000	15,000
39. Development of Atlantic Spadefish Recreational Fishery	South Carolina Wildlife and Marine Resource Dept. Charleston, SC	11,000	10,009

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
40. A Program to Increase Demand for Underutilized Species Among Recreational Fishermen	East Carolina University Greenville, NC	$80,000	$19,959
41. Cleansing Mechanisms of Florida Shellfish	University of South Florida Tampa, FL	69,000	35,665
42. Virgin Islands Fisheries Development	Virgin Islands Division of Fish and Wildlife St. Thomas, VI	88,000	56,750
Northeast Region			
43. New England Seafood Marketing Program	New England Fisheries Development Foundation Boston, MA	100,000	84,000
44. On-Board Quality Improvement	New England Fisheries Development Foundation Boston, MA	170,000	170,000
45. In-Plant Quality Program	New England Fisheries Development Foundation Boston, MA	120,000	108,000
46. Better Utilization of Scallops	New England Fisheries Development Foundation Boston, MA	75,000	75,000
47. Marketing Strategies for the New England Party Boat, Charter Boat, and Rental Fishing Boat Industry	PNR & Associates, Inc. Rosslyn, PA	74,983	29,600
48. Policies and Market Channels in Spain for Imported Frozen Squid	Andreas A. Holmsen University of Rhode Island Kingston, RI	12,390	12,000
49. Process Optimization of Surimi Manufacturing from Regionally Available Under-utilized Species and Frame Waste	Chong M. Lee University of Rhode Island Kingston, RI	70,000	32,749

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
50. Market Information Systems and Services Frozen Fishery Products Western Europe	Development Planning and Research Association Manhatten, KS	$100,000	$70,195
51. Mid-Atlantic Seafood Marketing Program	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	100,000	90,000
52. Develop a Squid Fishery in the Mid-Atlantic	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	167,000	165,000
53. Hybrid Refrigeration for Traditional and Non-Traditional Mid-Atlantic Fisheries	White Dove, Inc. Cape May, NJ	100,000	100,000
54. Great Lakes Seafood Marketing Program	Great Lakes Fisheries Development Foundation Grand Haven, MI	50,000	20,000
National Projects			
55. Development and Field Testing of Detection Kit for Paralytic Shellfish Poison	Bio-Metric System, Inc. Eden Prairie, MN	55,564	50,000
56. Detection of Ciguatoxin in Fish	Medical University of South Carolina Charleston, SC	226,061	66,516
57. Hepatitis A Virus Detection in Shellfish and Shellfish Harvest Areas	Baylor College of Medicine Houston, TX	89,616	22,404
58. Use of Liquid Smoke in Fishery Products	National Fisheries Education and Research Foundation Washington, DC	62,000	22,000
59. Evaluation of Controlled Atmosphere Packaged Seafood	National Fisheries Education and Research Foundation Washington, DC	100,000	25,000

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
60. Develop Process Procedures for Seafood Packed in Retortable Pouches	National Food Processors Association Washington, DC	$140,000	$60,855
61. Evaluation of the Nutritional Value of Fish and Fish Oils in Prevention and Treatment of Coronary Heart Diseases	Harvard Medical School Cambridge, MA	43,610	11,000
62. Public Health Evaluation of the Effects of Shellfish on Cholesterol and Lipoprotein in Humans	University of Washington Seattle, WA	100,000	25,835
63. Develop a System for Removal of Parasites in Fish Fillets	Pennsylvania State University State College, PA	47,400	31,600
64. Seafood Exhibit at the Food Marketing Institute	West Coast Fisheries Development Foundation Portland, OR	540,000	270,000
65. Seafood Exhibit at the National Grocers' Assn. NGA Show, 1984	New England Fisheries Development Foundation Portland, OR	25,000	17,000
66. Consumer Education and Promotion	National Fisheries Education and Research Foundation Washington, DC	455,000	115,000
67. Fish Oil Market Research	National Fish Meal and Oil Association Washington, DC	24,000	6,000
68. Market Research Supporting Development of Surimi Based Products	New England Fisheries Development Foundation Boston, MA	100,000	25,000
69. U.S. Coordination/ Participation SIAL	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	340,000	305,500

1983 S-K Awards

Project Title	Recipient	Funding Federal	Match
70. U.S. Seafood Exhibit at Alimentaria '84	New England Fisheries Development Foundation Boston, MA	$135,000	$124,000
71. Management Strategies for Artificial Reefs	Sport Fishing Institute Washington, DC	159,856	39,964
72. Fishing Piers: What Cities Can Do	The Waterfront Center Washington, DC	11,900	5,100
73. Fishing Vessel Safety Program	National Council of Fishing Vessel Safety and Insurance Washington, DC	48,000	12,000
74. Fishing Vessel Safety Monthly Column for Trade Publications	National Council of Fishing Vessel Safety and Insurance Washington, DC	4,560	1,140

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
Alaska Region			
1. Pollock Industry Development	Alaska Fisheries Development Foundation Anchorage, AK	$1,300,000	$849,200
2. Alaska Pollock Promotion and Education	Alaska Seafood Marketing Institute Juneau, AK	321,000	232,700
3. Recommended Whitefish Quality Guidelines	Alaska Seafood Marketing Institute Juneau, AK	18,700	11,300
4. Americanization of the Northeast Pacific Fisheries	Pacific Seafood Processors Association Seattle, WA	250,000	132,080
5. Quality Assurance Education Program/Groundfish	University of Alaska Anchorage, AK	112,570	49,227
Northwest Region			
6. Food Service and Institutional Seafood Marketing Development	West Coast Fisheries Development Foundation Portland, OR	250,000	117,500
7. Development of Methods for Washed Fish Flesh Production Utilization	West Coast Fisheries Development Foundation Portland, OR	100,000	45,880
8. Restaurant Training Module	West Coast Fisheries Development Foundation Portland, OR	33,460	17,000
9. White-Fleshed Fish in the Diet	West Coast Fisheries Development Foundation Portland, OR	23,730	13,733

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
10. Reconstituted Fillets and Portions of Minced Pacific Pollock - An alternative to Surimi Production	The Highliners Association Seattle, WA	$240,000	$136,000
11. Pollock Fillet Processing	Trans-Pacific Seafoods, Inc. Seattle, WA	60,000	40,000
12. Assessment of the Fishery Potential for Loligo Opalescens	Oregon Department of Fish and Wildlife Newport, OR	87,000	32,286
13. Washington Squid Fishery Development	Washington State Department of Fisheries Olympia, WA	77,000	33,000
14. Impact of Shellfish Consumption on Plasma Lipoproteins and Cholesterol Absorption in Humans	University of Washington Seattle, WA	90,000	21,912
15. Nutritional Composition of Shellfish: Fatty Acids and Sterols in Shellfish and in Surimi	University of Washington Seattle, WA	49,567	15,745
16. Seafood is Heart Food Recipe Contest and Guide	American Heart Association of Washington Seattle, WA	75,000	46,480
17. Recreational Angling for Non-Salmonoid Species	The Washington Charter Boat Association Westport, WA	48,000	33,000
18. Stock Delineation Study of Black Rockfish	Oregon Department of Fish and Wildlife Newport, OR	39,982	17,143
Southwest Region			
19. Regional Shellfish Production & Training, Palau	Pacific Fisheries Development Foundation Honolulu, HI	98,820	54,540

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
20. Pago Pago Mooring Docks, American Samoa	Pacific Fisheries Development Foundation Honolulu, HI	$121,000	$120,000
21. Boatyard and Repair Facility, Truk	Pacific Fisheries Development Foundation Honolulu, HI	66,400	65,000
22. Topminnow and Baitfish Test Fishing, Hawaii	Pacific Fisheries Development Foundation Honolulu, HI	5,000	5,000
23. Boat Launching Ramps, Guam	Pacific Fisheries Development Foundation Honolulu, HI	63,000	4,000
24. West Harbor Interim Improvements, Yap	Pacific Fisheries Development Foundation Honolulu, HI	24,000	23,000
25. Hawaii Seafood Promotion Committee	Pacific Fisheries Development Foundation Honolulu, HI	27,500	22,920
26. Hispanic Marketing Project: Pacific Whiting	West Coast Fisheries Development Foundation Portland, OR	94,940	40,000
27. Mackerel Fillet Marketing Project	San Pedro Mackerel Company Los Angeles, CA	160,000	147,692
28. Seafood Educational Program - Southern CA High Schools	Lee & Associates/Western Research Kitchens Los Angeles, CA	50,000	19,200
29. On-Board Handling of Troll-Caught Alabacore	Donna R. Jacoby Moss Landing, CA	22,000	14,458
30. West Coast Export Market Development	West Coast Fisheries Development Foundation Portland, OR	91,800	37,000

1984 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
31. Data Base for West Coast Fisheries Activities	West Coast Fisheries Development Foundation Portland, OR	$30,000	$20,000
32. Launching Ramps, Commonwealth of Northern Marianas	Commonwealth Government of Northern Marianas Saipan, CNMI	132,000	53,800
33. Launching Ramps, Guam	Government of Guam Tamuning, Guam	68,000	17,000
34. Administrative Support	Pacific Fisheries Development Foundation Honolulu, HI	208,280	12,000
Southeast Region			
35. Southeast Fisheries Development	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	1,265,000	727,500
36. Developing a Gulf of Mexico Squid Fishery	Louisiana State University Baton Rouge, LA	49,985	37,612
37. Surimi Plant-Northern Gulf of Mexico	Nichibei Fisheries, Inc. Bayou La Batre, AL	90,000	38,571
38. Finished Products Made from Surimi/Minced Fish	Billy Thrash Bayou La Batre, AL	50,000	33,333
39. Construction and Utilization of the Trawling Efficiency Device	Alabama Sea Grant Advisory Service Mobile, AL	25,000	10,785
40. Modeling of Water Quality Data for Oysters	Louisiana Department of Wildlife and Fish Baton Rouge, LA	80,000	20,000
41. Siting Plans for Establishment of Artificial Reefs in Gulf of Mexico	Mississippi/Alabama Sea Grant Consortium Ocean Springs, MS	115,000	33,273

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
42. Underutilized Recreational Fisheries Development	University of North Carolina Sea Grant College Program Raleigh, NC	$50,000	$13,368
43. Marine Fisheries Education Technology Transfer Center	University of Miami Miami, FL	30,000	24,236
44. Handling of Fish and Product Quality	Corporation for Development of Marine Resources San Juan, PR	25,000	6,250
45. Conch Enhancement in Puerto Rico	University of Puerto Rico Mayaguez, PR	35,000	34,252
46. Virgin Islands Exploratory Fishing for Deepwater Crustaceans	Government of the Virgin Islands, Division of Fish and Wildlife St. Thomas, VI	38,000	12,600
47. Virgin Islands Pelagic Fisheries Development	Honest Fish, Ltd. St. John, VI	30,000	16,250
Northeast Region			
48. Domestic and Export Marketing Activities to Increase Seafood Consumption	New England Fisheries Development Foundation Boston, MA	200,000	112,500
49. Improve On-Board Quality on Fishing Vessels	New England Fisheries Development Foundation Boston, MA	99,000	77,790
50. Plant Personnel Training to Improve Quality and Yield	New England Fisheries Development Foundation Boston, MA	80,000	57,930
51. Improve Two Major Types of Fishing Gear	New England Fisheries Development Foundation Boston, MA	70,000	48,640

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
52. New Methods to Process Fish Waste	New England Fisheries Development Foundation Boston, MA	$75,000	$38,640
53. Development of Semi Pelagic Trawls for Squid and Butterfish	MIT Sea Grant Program Cambridge, MA	34,000	24,000
54. New England Trawl Net Training Program	MIT Sea Grant Program Cambridge, MA	75,000	46,750
55. At-Sea Dogfish Processing Demonstration	High Seas Corp Fall River, MA	99,000	75,000
56. Hard Clam Management Plan for Suffolk County Waters	County of Suffolk Hauppauge, NY	200,000	93,000
57. Fishery Product Inspection Training Program	Kingsborough Community College Brooklyn, NY	26,000	10,859
58. A Coordinated Consumer Education Domestic and Export Marketing Program for the Mid-Atlantic Region	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	250,000	235,000
59. Seafood Quality Program for the Mid-Atlantic Region	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	200,000	188,000
60. The Economic Feasibility of Handling Spiny Dogfish Processing Wastes and in Maintaining a Viable Commercial Fishery	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	100,000	73,000
61. Feasiblity and Modeling of of the Use of New Jersey Salt Marshes to Treat Clam Processing Waste Waters	Lehigh University Center for Marine and Environmental Studies Bethlehem, PA	60,000	30,800
62. Market Development for the Commercial Sucker Fishery of Saginaw Bay, Lake Huron	Great Lakes Fisheries Development Foundation Grand Haven, MI	40,000	26,561

1984 S-K Awards

Project Title	Recipient	Funding Federal	Match
63. Advertising, Education and Promotional Project to Develop New Markets for Underutilized Species of Freshwater Fish	Great Lakes Fisheries Development Foundation Grand Haven, MI	$60,000	$30,000
National Projects			
64. Detection and Segregation of Defective Containers of Canned Salmon	Pacific Seafood Processors Association Seattle, WA	489,000	212,527
65. Detection of Ciguatoxin in Fish	Medical University of South Carolina Charleston, SC	85,000	21,300
66. Reduce Processing Requirement to Inhibit Botulism in Vacuum Packaged Smoked Fish	National Fisheries Education & Research Foundation Washington, DC	65,000	23,000
67. Develop an Alternative to the Use of Bisulfite in Shrimp	National Fisheries Education & Research Foundation Washington, DC	49,718	12,000
68. International Symposium on Structured Seafood	National Fisheries Education & Research Foundation Washington, DC	35,100	8,800
69. Procedures for Calculating Per Capita Consumption	National Fisheries Education & Research Foundation Washington, DC	40,400	10,100
70. Hazard Associated with Use of Bisulfite in Shrimp	University of Wisconsin Madison, WI	46,947	36,550
71. Upgrading the Value of Fish Oil	National Fish Meal and Oil Association Washington, DC	100,000	25,000

1984 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
72. Tuna Refrigeration and Preservation Manual	Living Marine Resources, Incorporated San Diego, CA	$54,364	$19,200
73. Industry Position Paper on Irradiated Foods	Brand Group, Incorporated Chicago, IL	75,000	75,000
74. Management of U.S. Seafood Sales Exhibits at Four Key International Food Shows	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	300,000	465,140
75. Seafood Export Guide	BBH Corporation Washington, DC	94,865	59,165
76. National Seafood Promotion 1985	West Coast Fisheries Development Foundation Portland, OR	100,000	85,000
77. Seafood Exhibit at the Food Marketing Institute	West Coast Fisheries Development Foundation Portland, OR	27,100	11,500
78. National Conference on Seafood and Health	West Coast Fisheries Development Foundation Portland, OR	62,600	23,000
79. Biological Stabilization of Crab Scrap and Processing Wastewaters	NASA/National Space Tech. Laboratories Pascagoula, MS	115,000	90,000
80. Artificial Reef Development	Sport Fishing Institute Washington, DC	150,000	37,504
81. Export Guide for Recreational Fishing	AFTMA Sport Fisheries Education Foundation Arlington Heights, IL	28,553	12,575
82. Development of a Pilot Electronic Marketing System for Lobster	Massachusetts Lobstermen's Association Marshfield, MA	62,538	26,802

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
Alaska Region			
1. Quality Assurance Education for the Alaska Groundfish Industry	University of Alaska Marine Advisory Program Anchorage, AK	$50,000	$48,468
2. Alaska Pollock Market Development	Alaska Seafood Marketing Institute Juneau, AK	250,000	210,600
3. Pacific Pollock Protein Project	Alaska Fisheries Development Anchorage, AK	1,190,202	752,900
Northwest Region			
4. Impacts of Fish Oils on Plasma Lipids in Humans	University of Washington Seattle, WA	53,297	11,169
5. Sablefish Soft Flesh Analysis	University of Washington Seattle, WA	37,818	17,337
6. Optical Parasite Detection System	Design Systems, Inc. Auburn, WA	70,000	38,050
7. Seafood and Health: Promotion and Market Development	West Coast Fisheries Development Foundation Portland, OR	150,000	37,500
8. Development of Washed Fish Flesh Production and Utilization	West Coast Fisheries Development Foundation Portland, OR	108,750	52,662
9. Pacific Whiting Industry Development Program	West Coast Fisheries Development Foundation Portland, OR	100,000	52,000
10. Restaurant Marketing Development of Albacore Tuna	West Coast Fisheries Development Foundation Portland, OR	29,350	15,000

1985 S-K Awards

Project Title	Recipient	Funding Federal	Funding Match
11. Market Development of Alaska Groundfish Products	Pacific Seafood Processors Association Seattle, WA	$220,686	$97,300
12. Promotion of Washington Charterboat Bottomfishing	Washington Charterboat Association Westport, WA	75,000	38,300
13. Promotion of Oregon Charterboat Bottomfishing	Oregon State University Corvallis, OR	75,000	31,483
14. NPFVOA Safety Orientation Program	North Pacific Fishing Vessel Owners Association Seattle, WA	100,000	63,000
15. Vessel Safety/Accident Reduction through Education Program	North Pacific Fishery Vessel Owners' Association Seattle, WA	45,500	19,500
Southwest Region			
16. Model to Analyze Economic Effects of Species Availability	National Coalition for Marine Conservation San Diego, CA	50,940	21,831
17. Seafood Processing Plant	Tautai Fisheries Company American Samoa Pago Pago, American Samoa	10,000	4,300
18. Boat Launching Ramps, Phase II, Guam	Pacific Fisheries Development Foundation Honolulu, HI	182,003	155,000
19. Kosrae Pole and Line Tuna Fishing	Pacific Fisheries Development Foundation Honolulu, HI	40,000	35,803
20. Fish Cannery in Western Pacific to Supply Local Consumption	Pacific Fisheries Development Foundation Honolulu, HI	70,000	10,000
21. Regional Shellfish Production and Training, Palau	Pacific Fisheries Development Foundation Honolulu, HI	125,320	51,640

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
22. Develop U.S. Albacore Fishery in South Pacific	Pacific Fisheries Development Foundation Honolulu, HI	$100,000	$148,500
23. Trochus and Clam Culture at Pohnpei State Hatchery	Pacific Fisheries Development Foundation Honolulu, HI	34,000	49,356
24. Fisheries Economic Assessment Model	West Coast Fisheries Development Foundation Portland, OR	50,000	20,000
25. Hispanic Marketing, Pacific Whiting: Phase III	West Coast Fisheries Development Foundation Portland, OR	50,000	23,000
26. Seafood Retail [illegible] School, [illegible]	West Coast Fisheries Development Foundation Portland, Oregon	39,000	20,000
27. Export Market Development for Pacific Groundfish	West Coast Fisheries Development Foundation Portland, OR	65,800	20,000
28. Develop Alternate Domestic Markets for Albacore	Western Fishboat Owners Association San Diego, CA	60,000	46,750
29. Ocean Dumping as a Solution to Seafood Waste Disposal Problems	University of Southern California Los Angeles, CA	99,933	25,000
30. Hawaii Artificial Reef Development	University of Hawaii Honolulu, HI	191,569	58,644
Southeast Region			
31. Guidelines for the Emerging Tuna Fishery in the Southeast	University of Florida Gainesville, FL	32,487	18,750
32. Resource Evaluation of Bigeye Scad	Government of the Virgin Islands St. Croix, U.S.V.I	46,000	20,161

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
33. Development of Modified AOAC Method for Determining Weight of Block, Frozen, Peeled and/or Deveined Shrimp	American Shrimp Processors Association New Orleans, LA	$23,360	$5,840
34. Southeastern Seafood Products Quality Code	Southeastern Fisheries Association Tallahassee, FL	40,000	36,875
35. Loss Control and Risk Financing, Gulf and South Atlantic Commercial Fishing Fleet	Southeastern Fisheries Association Tallahassee, FL	69,600	33,800
36. Molluscan Shellfish Quality and Market Standards	Shellfish Institute of North America Washington, DC	48,000	12,500
37. Gulf and South Atlantic Fisheries Development	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	1,084,812	674,188
38. Seafood Exhibits at Foreign Trade Shows	Gulf and South Atlantic Fisheries Development Foundation Tampa, FL	125,000	62,500
39. Increase Recreational Use of Underutilized Species	East Carolina University Greenville, NC	57,900	14,475
40. Feasibility of Using FADs to Enhance Sport Fisheries in Puerto Rico & U.S.V.I.	Old Dominion University Foundation Norfolk, VA	149,597	46,506
Northeast Region			
41. Quality Seafood Testing Project	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	150,000	108,620
42. Consumer Education, Domestic and Export Marketing Program	Mid-Atlantic Fisheries Development Foundation Boston, MA	200,000	200,000

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
43. Seafood Quality	New England Fisheries Development Foundation Boston, MA	$50,000	$21,000
44. Fish Waste Resource Recovery	New England Fisheries Development Foundation Boston, MA	300,000	129,000
45. Feasibility Modeling Use of NJ Salt Marshes to Treat Clam Processing Wastewaters	Lehigh University Bethlehem, PA	55,865	31,395
46. Advertising/Educational/ Promotional Project to Develop New Domestic and Export Markets of Under-utilized Species of Freshwater Fish	Great Lakes Fisheries Development Foundation Grand Haven, MI	55,000	27,500
47. Mixed Species Market Development Program	New England Fisheries Development Foundation Boston, MA	300,000	200,000
48. State Supported Fishermen's Mutual Insurance Association	Clark, Ladner, Fortenbaugh and Young Haddonfield, NJ	66,824	41,000
49. Economics of Small Freezer Trawlers	University of Rhode Island Kingston, RI	32,330	14,839
50. Marketing Package-Harvesting Surimi/Analog Production	New Jersey Department of Agriculture Trenton, NJ	53,300	39,159
National Projects			
51. Preliminary Analysis of a National Seafood Inspection Program	ICF, Inc. Washington, DC	75,137	18,374

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
52. Fishing Vessel Insurance and Safety Programs	National Council for Fishing Vessel Safety and Insurance Washington, DC	$143,514	$37,700
53. Management of Seafood U.S.A Exhibits	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	87,100	35,000
54. Implement Artificial Reef Technology for Development of Marine Recreational Fishing Opportunity	Sport Fishing Institute Washington, DC	150,000	37,500
55. Development & Implementation of Uniform Product Code	National Fisheries Education and Research Foundation Washington, DC	110,000	55,000
56. Processing Fish Oil and Its Derivatives with Supercritical Carbon Dioxide	National Fish Meal and Oil Association Washington, DC	138,000	34,600
57. Market Research for Tackle Industry to Enter Export Markets	American Fishing Tackle Manufacturers Association Arlington Heights, IL	40,000	15,000
58. Industry Nutritional/ Information Support Material	National Fisheries Education and Research Foundation Washington, DC	26,100	20,800
59. Fish and Seafood Industry Public Service Announcements	National Fisheries Education and Research Foundation Washington, DC	140,000	35,000
60. Fishery Management Regulation Impact on Safety	National Council of Fishing Vessel Safety and Insurance Washington, DC	$38,000	$9,500

1985 S-K Awards

Project Title	Recipient	Funding Federal	Match
61. Management of U.S. Seafood Sales Exhibits at Four Key International Food Shows	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	300,000	465,140
62. Detection and Segregation of Defective Containers of Canned Salmon	Pacific Seafood Processors Association Seattle, Washington	599,000	253,678

Project Title	Recipient	Funding Federal	Match
10. Long Term Effect of Modifying the Diet to Include Groundfish	University of Washington Department of Nutritional Sciences Seattle, WA	$50,888	$12,751
11. At-Sea Quality Standards and Inspection for Trawler/ Processor Vessels	Alaska Factory Trawlers Association Seattle, WA	50,000	24,200
12. Promotion of Oregon Recreational Bottomfishing	Oregon Coast Association Newport, OR	57,700	29,587
13. Promotion of Washington Recreational Bottomfishing	Washington State Charterboat Association Westport, WA	51,500	26,000
14. Impacts of Fish Oils on Plasma Lipids in Humans	University of Washington Seattle, WA	44,381	21,220
Southwest Region			
15. Develop U.S. Albacore Fishery in South Pacific	Pacific Fisheries Development Foundation Honolulu, HI	166,800	172,800
16. On-Board Handling of Albacore Tuna	University of California Food Science & Technology Extension Davis, CA	32,998	18,875
17. Alternative Gear Development	Coastal Fisheries Foundation Sausalito, CA	75,000	19,000
18. West Coast Groundfish Mesh Size Study	West Coast Fisheries Development Foundation Portland, OR	25,000	8,000
19. Hawaiian Tuna Handline Fishery Exploration and Development	Pacific Fisheries Development Foundation Honolulu, HI	76,450	25,000

1986 S-K Awards

Project Title	Recipient	Funding Federal	Match
20. Federated States of Micronesia Fish Poisoning Investigations	Pacific Fisheries Development Foundation Honolulu, HI	$19,460	$7,300
21. Albacore Alternate Market Program	Tennyson & Associates Portland, OR	90,000	67,200
22. Smiling Cove Dock, Saipan	Pacific Fisheries Development Foundation Honolulu, HI	104,250	65,000
23. Truth in Seafood Advertising	West Coast Fisheries Development Foundation Portland, OR	50,000	25,000
24. Develop Alternate Products for Underutilized Species	West Coast Fisheries Development Foundation Portland, OR	25,000	13,500
25. Palau Deep Water Shrimp Survey and Feasibility Study	Pacific Fisheries Development Foundation Honolulu, HI	55,600	20,000
26. Fisheries Economic Assessment Model	West Coast Fisheries Development Foundation Portland, OR	52,000	20,000
27. Increase Use of Underutilized Recreational Fisheries	Sea Grant Marine Advisory Program University of California Davis, CA	19,868	9,633
28. Trochus/Giant Clam Hatchery Feasibility Study, Yap	Pacific Fisheries Development Foundation Honolulu, HI	13,900	4,320
29. Clam Reseeding in Yap State	Pacific Fisheries Development Foundation Honolulu, HI	38,410	13,600
30. Retail Training School	West Coast Fisheries Development Foundation Portland, OR	60,000	25,000

Project Title	Recipient	Funding Federal	Match
40. Control of Hepatitis A Virus Contamination of Shellfish	University of North Carolina Chapel Hill, NC	$32,000	$8,000
41. Molluscan Shellfish Quality and Market Standards	Shellfish Institute of North America Washington, DC	44,000	10,500
Northeast Region			
42. Shrimp Separator Trawl	Marine Department of Marine Fisheries Technology Service Augusta, ME	24,250	13,250
43. Coordination of Conservation Engineering Initiative	New England Fisheries Development Foundation Boston, MA	40,000	26,670
44. Regional Marketing: A Cooperative Mixed Species Program	New England Fisheries Development Foundation Boston, MA	325,650	217,100
45. Seafood Health and Nutrition, Consumer Education, and Export Program for the Mid-Atlantic Region	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	250,000	105,280
46. Feasibility and Modeling of the Use of NJ Salt Marshes to Treat Clam Processing Plants	Lehigh University Center for Marine & Environmental Studies Bethlehem, PA	110,000	45,504
47. Characterization and Utilization of Wastes from Ocean Quahog & Surf Clam Processing Plants	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	76,900	48,675
48. Advertising Educational and Promotional Project to Develop New Domestic and Export Markets for Underutilized Species of Freshwater Fish	Great Lakes Fisheries Development Foundation Grand Haven, MI	60,000	30,000

Project Title	Recipient	Funding Federal	Match
49. A Regional Towed Gear Observation System	MIT Sea Grant Program Cambridge, MA	$125,000	$102,940
50. Utilization of Menhaden Mince and Surimi for Direct Consumption and Use in Further Processed Foods	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	44,500	30,500
51. Fish Waste Resource Recovery	New England Fisheries Development Foundation Boston, MA	300,000	129,000
National Projects			
52. Complete Economic Analysis of Marine Recreational Fishing	Sport Fishing Institute Washington, DC	111,910	28,616
53. Develop Two Videotape Training Programs for Production and Processing Personnel	National Fisheries Education & Research Foundation Washington, DC	48,000	12,000
54. Develop International Standards/Processing Guidelines for Frozen Squid Products	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	50,000	12,500
55. Description of Control Points in Harvesting and Processing Systems of Fresh and Frozen Domestic Seafood Industry	National Fisheries Education & Research Foundation Washington, DC	98,500	49,600
56. Investigations to Determine Nutritional Equivalency of Surimi	National Food Processors Association Washington, DC	125,000	53,565
57. A National Seafood/Health Nutrition Communication Program	National Fisheries Education & Research Foundation Washington, DC	195,260	48,815

Project Title	Recipient	Funding Federal	Match
58. Hyperfiltration Technology for Recovery/Utilization of Protein in Surimi Process Waters	National Food Processors Association Dublin, CA	$103,560	$25,890
59. Matching Capital to Resources in the Fish Harvesting Industry: Limited Entry and/or Other Alternatives	Atlantic Offshore Fishermen's Association Newport, RI	102,821	43,500
60. Development and Implementation of Uniform Product Code	National Fisheries Education and Research Foundation Washington, DC	157,500	96,000
61. Fishing Vessel Insurance & Safety Programs	National Council for Fishing Safety & Insurance Washington, DC	150,000	38,320
62. Management of Seafood U.S.A. Exhibits	Mid-Atlantic Fisheries Development Foundation Annapolis, MD	184,000	87,500

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